Genetic Information & Crime Investigation

Social, Ethical and Public Policy Aspects of the Establishment, Expansion and Police Use of the National DNA Database

Robin Williams Paul Johnson Paul Martin

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Robin Williams Paul Johnson Paul Martin
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Introduction

The recent incorporation of forensic DNA identification technology into the criminal justice systems of a growing number of countries has been fast and far reaching. In developing and using DNA profiling for forensic purposes many criminal jurisdictions across the world have followed a common trajectory: from its case-by-case use to support the investigation and prosecution of a small number of homicides and sexual assaults, to the recovery of biological samples and the comparison of DNA profiles as an extensive and routine practice in the investigation of a wide range of crimes including property and auto crime. Essential to this development has been the introduction and expansion of DNA databases or 'registers' which contain collections of genetic profiles derived from biological samples lawfully collected from widening categories of individuals. The National DNA Database (NDNAD) of England & Wales is one such database.

First established in 1995, the NDNAD has expanded to hold a large collection of DNA profiles which are continuously searched against newly obtained profiles derived from samples taken in support of the investigation of all types of crime. Government and police service enthusiasm for its potential contribution to crime detection has been strong from the outset and many public pronouncements by successive Government Ministers have celebrated the contribution of DNA profiling and the NDNAD to the successful investigation of specific crimes or of certain types of offences. For Lord Falconer: 'Each DNA sample, once loaded onto the National DNA database, could potentially help crack serious unsolved crimes, such as rape or murder…The database is a vital weapon in law enforcement which has already helped to detect thousands of repeat criminals' (Home Office Press Release 091/2003). Her Majesty's Inspector of Constabulary David Blakey described DNA analysis as '…by far the most significant breakthrough in crime detection since the inception of fingerprint identification' (MHIC 2000: 12). And Chief Constable David Coleman, Chairman of the NDNAD Board, recently asserted that '…the Database is capable of making a huge contribution to the detection and prevention of crime in the United Kingdom, and has become a strategic national asset….' (NDNAD Annual Report 2002-2003: 4).

Such general assertions of the potential of DNA profiling and databasing have been well received by many UK legislators and jurists. There is also evidence of widespread

public support for the collection and retention of DNA taken from convicted offenders so that their profiles may be compared to genetic material obtained from any subsequent scene of crime (see Human Genetics Commission 2002). There have certainly been many well publicised serious crime investigations in which individual suspects have first been identified through NDNAD matches or in which a large number of potential suspects – the investigation of which would have required considerable police resources – has been radically reduced by genetic exclusions made possible by NDNAD searches. However, any sober assessment of the overall significance of DNA profiling and the NDNAD to the detection of crime requires a recognition both of the relatively small number of crime scenes from which biological material suitable for DNA profiling and data-base searching is currently recovered and of the varying significance of DNA matches and mismatches to the course of particular investigations.

In 2002-2003 (the latest year for which full data are available), 5,988,450 offences were recorded by the police in England & Wales. Crime Scene Examiners attended 998,000 (17%) of these crime scenes and collected biological material intended for DNA profiling from 100,000 of them. Only just over half of these samples (57,000) resulted in crime scene profiles added to the NDNAD. To summarise this attrition process: searchable DNA profiles were obtained from the examination of the scenes of only 1% of recorded crimes.

Because of the small number of recorded crimes from which DNA is recovered, the contribution of DNA profiling and databasing to the detection of crime overall may appear small. Whilst 1,388,894 of the crimes recorded in 2002/2003 were detected by the police, only 21,082 of these are described in official statistics as having been detected through the use of DNA. Thus, Home Office figures show that 'DNA detections' comprised only 1.6% of all detections, although the contribution of DNA to detections varied according to crime types (0.3% of all detections for violent and sexual offences, 7.9% of all detections for vehicle thefts, and 8.3% of all detections in cases of domestic burglary were attributed to NDNAD matches).

These numbers may seem disappointing in the light of the claims reported in the earlier paragraphs. However, the significant positive contribution to investigations which can be made when DNA profiling and NDNAD searching are undertaken can be seen by comparing the national detection rates with the detection rates in cases where DNA profiles are obtained and loaded onto the NDNAD. For example the

national detection rate of 24% for all crime is raised to 38% in cases where a DNA profile from the crime scene was loaded onto the NDNAD, and in cases of domestic burglary the detection rate rises from 15% to 48%.

Whilst legislative changes and innovations in police operational practice may serve further to increase the contribution of DNA profiling and databasing to the detection of crime in the future, it is important to recognise that any such developments will only be possible where public support for, and confidence in, these technologies is maintained. David Blunkett, the current Home Secretary, has recently asserted that: 'The use of genetic material is an emotive topic. People are naturally concerned to see that the handling and use of original genetic material, and the information derived from it, is carried out ethically and lawfully…' (NDNAD 2003: 3). In recent years, as interest in DNA profiling and databasing has grown, there have been increasing calls for greater transparency in police uses of these technologies in general and in the governance of the NDNAD in particular. A recent review of the Forensic Science Service may herald some important changes in the current governance arrangements of the database. The immanence of these changes provides a context for this report on the development, implementation, recent expansion, and continuing uses of the NDNAD. The report aims to:

- describe the development and implementation of DNA profiling and databasing within England & Wales;

- assess the current contribution of the NDNAD to the Government's aim of preventing, detecting and reducing crime;

- examine the arrangements for managing and governing this large collection of human tissue samples and derived profiles;

- consider the ethical issues which arise from the expansion and continuing use of DNA samples and profiles taken from widening groups of individuals; and

- discuss the potential future developments in DNA profiling and databasing which may impact upon the organization and application of the NDNAD.

We hope to provide an account of the NDNAD and its uses that will stimulate discussion and debate among and across a range of stakeholders (including forensic scientists, crime scene personnel, police officers, policy makers, and members of the legal profession) who contribute to making the NDNAD 'work', and among other interested parties (including human rights groups, academics, and bio-ethicists) who respond to, and sometimes influence, understandings and applications of this forensic instrument. But we also hope to promote, in supplying a comprehensive overview of the historical development, current use, and potential changes in DNA profiling and databasing in England & Wales, an understanding of the NDNAD beyond those with a 'hands on' interest in its use.

This report has been compiled as part of a wider study of police uses of DNA profiling and the NDNAD which was funded by The Wellcome Trust. In the course of this work we have examined a large number of policy and operational documents produced by the Home Office and individual Police Forces. We have also collected documentary material from a variety of other stakeholders including the Human Genetics Commission, the Information Commissioner and several organizations and groups who have an interest in the state collection and use of different kinds of genetic information. In addition we have carried out more than 60 semi-structured interviews with individuals from organizations directly involved in either using, or commenting upon the use of, DNA profiling in the criminal justice system - the police, forensic scientists, crime scene examiners, legal professionals, legislators, and those concerned with human rights issues – with the aim of providing a comprehensive 'map' of views relating to the use of DNA profiling by the police. The nature of this report is such that it does not include much of the technical detail of the wider study. Nor does it include a systematic assessment of each stakeholder's views. Rather, we draw upon this range of documentary and verbal sources as a means of elucidating the legal, ethical and practical issues that have arisen through the establishment and expanding use of the NDNAD.

Outline of the report

Chapter One provides an introductory description of the NDNAD. We outline the structure and operational capabilities of the NDNAD and, in particular, the types of 'speculative searching' that the database now routinely enables. As an introduction to the following chapters we contextualize a number of issues, both investigative and ethical, which are raised by the continuing expansion and use of the database.

Chapter Two explores the early applications of DNA profiling in police case work during the mid to late 1980s. We assess the initial impact of this technology within policing and its subsequent recognition and development by Government as a reliable and robust forensic technology. We describe how the increased use of DNA profiling within forensic police work both contributed to, and benefited from, the establishment of the technology as a viable prosecutorial resource. The combination of developing intelligence and evidential uses of DNA profiling in the late 1980s and early 1990s can be seen as foundational to the creation of the NDNAD in 1995.

Chapter Three provides a historical assessment of the legislative framework that has enabled the establishment, and subsequent expansion, of the NDNAD. Three forms of legislative support underpin the NDNAD: first, legislation affords the police the power to collect DNA samples from individuals without consent; secondly, it allows the police to retain those samples and derived profiles in a database; and thirdly, it permits the further and future use of retained samples and profiles. This comprehensive legislative framework has been developed through a number of important amendments to the Police and Criminal Evidence Act (1984). These changes have been enacted in relation to a number of conditions: recommendations made by Government commissions; requests and suggestions made by the police; the agendas of policy makers; failures and problems arising from the use of the NDNAD; and the judgements from relevant judicial proceedings.

Chapter Four looks at the role of the NDNAD in relation to the broad policy agendas of Government which assert strong commitments to improve crime detection, prevention and reduction as well as making fiscal improvements across the public sector. The NDNAD has been the recipient of substantial Government investment, especially through the DNA Expansion Programme, and this support must be understood in relation to a history of expectations about the potential increases in investigative efficiency and effectiveness that the NDNAD can deliver within policing. In assessing such efficiency and effectiveness we look at how the performance of the NDNAD is both conceptualized and measured, what auditing procedures are in place to ensure such measures are accurate, and how Government instruments which attempt to standardize measurements produce a range of statistical outcomes.

Chapter Five explores the governance arrangements for the NDNAD. The NDNAD is maintained and operated by a Custodian (currently the Chief Scientist of the FSS) who is required to observe certain procedures and standards outlined in a *Memorandum of*

Understanding agreed between the Custodian and ACPO and issued by The National DNA Database Board. The NDNAD Board is comprised of members of the police, the Home Office, the FSS and, more recently, a representative from the Human Genetic Commission. However, since the Royal Commission on Criminal Justice (1993) there have been recommendations for the establishment of independent scrutiny and over-sight of the database. More recently a review of the FSS, undertaken by Robert McFarland, has made specific recommendations about (and criticisms of) the dual role of the FSS as both the NDNAD operator and a supplier of forensic services to the police. We explore the historical development of these governance arrangements, their current effect on police uses of the NDNAD, and assess the likelihood of important changes to them in the near future.

Chapter Six provides a consideration of the ethical issues which have been raised by critics of the growth of DNA profiling and databasing by the police. A series of ongoing commentaries, offered by those concerned with human rights and civil liberties, and often drawing upon national and European legislation, assert DNA profiling and databasing to be socially and ethically problematic. These commentaries, whilst forming an important and valid critical counterpoint to the Government's enthusiastic expansion of the NDNAD, often fail to discern subtle issues that arise from different forensic uses of DNA. Whilst the majority of these commentaries are directed to the retention and use of DNA from innocent individuals – a situation which has been challenged three times in the courts in *R v Marper & S* (2002a, 2002b, 2004) – there are also a range of other social and ethical factors pertaining to DNA collection, storage, and use that are frequently neglected.

Chapter Seven explores the potential for future developments and possible changes in DNA profiling and databasing. We identify three types of change that may affect the forensic use of DNA in the future: first, in 'front end developments' that may alter the work that forensic examiners undertake at scenes of crime; secondly, in laboratory applications where technological advances may allow a range of new ways to analyse genetic material in order to gain information about individuals; and thirdly, in possible modifications to the form of the database itself to either further expand its content or extend its connections with other forensic or non-forensic databases both within the UK and abroad.

Chapter Eight concludes the report and offers a series of recommendations to those involved in policy making.

Chapter One

The National DNA Database

1.1 What is the NDNAD?

The National DNA Database (NDNAD) of England & Wales is a police intelligence database which holds a large collection of DNA profiles derived from the analysis of biological samples owned by the Chief Officers of the individual forces who collected them from individuals and from scenes of crime. The database is managed on behalf of the Association of Chief Police Officers (ACPO) by the Forensic Science Service (FSS), currently a UK Government agency. The NDNAD was established on April 10th 1995 as the first of its kind. It currently remains the largest such 'national' database in the world (it contains the largest number of individual profiles and also holds the largest proportion of profiles per head of the population of any criminal jurisdiction). It includes DNA profiles which have been derived from biological samples obtained from three sources: from scenes of crime, from known individuals 'suspected of involvement in crime' (samples obtained from individuals are known as criminal justice or 'CJ' samples) and from volunteers (most usually obtained by the police during a mass, or 'intelligence led', DNA screen).

Crime scene samples are collected wherever potential biological material relevant to an investigation is identified at a crime scene by police or external specialist crime scene examiners. In addition, the police are empowered to collect biological samples for the construction of reference profiles from individuals under a wide variety of circumstances and from different 'categories' of individuals: samples are taken without consent from those arrested for a recordable offence and with consent from volunteers. These forms of collection are supported by a legislative framework originating in 1994 and modified several times since then. All profiles which meet minimum criteria for inclusion are loaded onto the NDNAD.

Each crime scene sample DNA profile (crime scene profile) and Criminal Justice sample DNA profile (CJ profile) newly loaded onto the NDNAD is 'speculatively searched' against all profiles already held on the database. Such speculative searches can potentially establish links between crime scene and CJ profiles in four different ways: a new CJ profile may match a pre-existing crime scene profile (which suggests that the

individual sampled may have left their biological material at a previous crime scene); a new crime scene profile may match an already recorded individual CJ profile (which suggests that someone already known to have been suspected of involvement in a previous crime may also have left their biological material at a newly examined crime scene); there may be a match between a new and previously loaded crime scene profile (which suggests that the same – as yet unidentified individual – may have left their biological material at both crime scenes); or there may be a match between a new CJ profile and a previously held CJ profile (which suggests that the same individual has been sampled twice – either because the force which took the sample was not able to check the relevant record, or because the person sampled gave a false name). In each case, if the NDNAD produces a 'hit' between a new profile and a pre-existing record, the 'DNA match' is reported - as 'intelligence' - to whichever police force (or forces) supplied the original samples for analysis.

In the case of samples obtained from volunteers the use of profiles for speculative searching is limited to instances where specific forms of consent are provided. Volunteers are invited to give one of two types of consent to enable their DNA to be used: the first is consent to the comparison of their profile to DNA profiles obtained in the course of the investigation of a specific crime (a one off use, after which the voluntary sample and profile are destroyed); the second is consent to the loading of their profile on to the NDNAD to be retained and routinely speculatively searched against all current and subsequently loaded profiles. This second type of consent is deemed 'irrevocable' by the enabling legislation.

In addition to each of the samples and profiles described above, the police also collect DNA from serving police officers and store the derived profiles on the Police Elimination Database (PED). Since the Police (Amendment) Regulations (2002), all new police officers are required to provide such samples as a condition of their appointment, but all officers in post before the introduction of this legislation can only be invited to volunteer their samples for inclusion. Profiles derived from these samples are held on a separate database and are used to eliminate officers' DNA from a crime scene which may have been left there as the result of innocent contamination during investigation. The PED is not speculatively searched. A search of the PED can only be initiated at the request of a senior investigating officer or scientific support manager when either believes contamination at a crime scene has taken place.

These current lawful uses of DNA profiles for speculative searching by the police are summarised in Table 1.

Table 1
Current extent of permitted speculative searching of DNA profiles

New DNA profiles from samples collected by the Police

Databased DNA Profiles	Crime Scene	CJ	PED	Voluntary (I)*	Voluntary (II)**
Crime Scene	Permitted	Permitted	Not Permitted (specified circumstance only)	Not Permitted (case specific only)	Permitted
CJ	Permitted	Permitted	Not Permitted	Not Permitted	Permitted
PED	Not Permitted (case-specific where circumstances necessitate)	Not Permitted	Not Permitted	Not Permitted	Not Permitted
Voluntary	Permitted	Permitted	Not Permitted	Not Permitted	Permitted

*volunteer consents for case-specific use of DNA
**volunteer consents for inclusion of DNA on NDNAD

The significance of the NDNAD for criminal investigations largely lies in its provision of automated forms of speculative searching to assist in the inclusion and exclusion of potential suspects wherever relevant biological evidence yielding DNA profiles is available. Of course the use of DNA profiling for investigative and evidential purposes does not automatically necessitate the existence of a DNA archive or database: DNA samples could be collected and used simply as corroborative evidence following the identification of a suspect. Yet the existence of the NDNAD, and its capacity to facilitate speculative searches of its archive, is now the central element in the routine use of DNA for investigative purposes.

The NDNAD is deemed an 'intelligence' database and the profiles which it stores, along with the samples from which those profiles were obtained, are used by the police to generate intelligence information to be further followed up by investigators. The NDNAD is not a prosecutorial instrument in the sense that any DNA evidence presented in support of a criminal prosecution must be derived from new samples of biological material taken from the accused individual. It is this second sample, the

profile derived from it, and the results obtained from comparing it to crime scene sample profiles, which will be presented to the court by a recognised scientific expert.

Recognition of the potential value of the NDNAD as an important source of forensic intelligence has led to the provision of substantial Government investment in DNA profiling as well as legislative support for extended powers of sampling. These two forms of support have together facilitated the very considerable expansion in the size of the NDNAD since its establishment in 1995. The latest figures available show the database to contain 193,138 unmatched profiles obtained from scenes of crime and 2,099,964 profiles of known individuals (NDNAD Annual Report 2002-2003).

1.2 The NDNAD and police investigations

The increased uses of DNA profiling and databasing within criminal investigations in England & Wales and elsewhere has been the subject of recurrent debate amongst a range of policy makers, police personnel, academics, and social commentators. Of particular importance has been the question of how forensic DNA profiling and databasing has both facilitated and reflected important changes in the organisational practices of policing. Some have gone so far to claim that this technology has not merely enhanced existing police capacity, but has even begun to replace 'the slow, tedious and expensive traditional investigative methods of police interviews' (Watson 1999: 325). Whilst this may be an exaggerated claim, it is often acknowledged that the introduction of DNA profiling within novel kinds of intelligence-led policing, has led to some spectacular and many humdrum investigative successes.

Following Ericson and Shearing (1986), it is arguable that the increased use of, and reliance upon, DNA profiling within policing exemplifies a more general development - the 'scientification of police work' - in which formal scientific reasoning along with technological inventiveness has become an increasingly important 'means by which the police effect closure and express authoritative certainty about what they know and the decisions they have taken' (Ericson and Haggerty 1997: 358). Understood this way, DNA profiling is one instance of the widespread use of science and technology both to lend specific authority to preferred versions of contested accounts of 'who did what to whom, when and why' in particular investigative contexts, and also to provide support for the legitimacy of police actions as representing the 'public interest' in crime prevention and detection in general (Ericson and Shearing 1986: 134). From this perspective, DNA profiling and databasing can be understood as one of a series of closely related practices that together comprise a technologically

facilitated infrastructure of intelligence gathering aimed at crime detection, reduction and the risk management of a 'suspect population'.

Whilst scientific rationality and technological instrumentality undoubtedly function as increasingly important aspects of policing in general it is not always easy to assess the significance of the contribution of individual innovations to changing police investigations. There are those who argue that the majority of criminal investigations have always been shaped by an attentiveness to the actions of individuals already known to the police. In other words that most investigations have always proceeded through the re-selection of already known suspects and the subsequent effort to construct cases against one or several such individuals by drawing on a variety of informational forms including physical evidence, witness statements, observation and police interviews (see, for example: Packer, 1968; Matza, 1969; McConville et.al, 1991; Sanders & Young, 2002). Such working practices of 'policing by suspicion' are said to engender amongst the police a strong and persistent interest in the ongoing collection, storage and retrieval of information about individuals who have come to their attention (or who have been made the object of their attention) in a variety of ways and for a variety of reasons (Manning, 1977).

If investigative practices are understood this way, then developments in forensic DNA profiling and data-basing may be important, not because they contribute to any transformation in investigative practices, but because they are part of a broader attempt to create a socially acceptable image of 'due process' policing in which disinterested truth seeking by investigators is supported by scientific objectivity. Some commentators (for example, see: Amey et. al, 1996; Barton and Evans, 1999; Gill, 2000; Heaton, 2000, John and Maguire, 2003; Maguire and John, 1995) argue that investment in increasingly complex information handling systems simply provide a technological gloss on qualitatively variable knowledge of suspect populations already constructed through highly localised, informal and often unreliable information. The result is that '…in the process of targeting these individuals the organisation is more likely to generate further intelligence on them, thus justifying their selection as targets both retrospectively and prospectively' (Innes, 2003a: 74).

This view was substantiated by a recent sociological analysis of the process of criminal investigation in the UK where the role of forensic science, as one of several 'technologies of knowledge production', was analyzed in relation to the investigation of serious crime (Innes, 2003b). In this study, and in a related unpublished report,

(Innes and Clarke, nd), Innes described how forensic science evidence and its interpretation by experts was attributed particular value by the police and how such information was used by the police to confirm or disconfirm their own views of criminal actions and identities as well as to reshape or extend their preferred accounts at various stages of an investigation:

> The search for contact trace materials is framed by the existing knowledge held by an investigation, but in turn the analysis of these traces often causes alterations in the details of the narrative that is being constructed. Because evidence based on contact trace materials is often held to be objective than alternative sources of evidence, it is frequently pivotal in the narrative, establishing and warranting some of the key facts of the police account (Innes, 2003b: 156).

This debate about the role of DNA profiling and databasing within policing is embedded within a more general set of arguments about its potential to provide an economic, effective and efficient means of criminal detection. For some, particularly those inspired by the 'criminalistic' idea of the potential to continually expand the 'science of crime' (see, for example: Fisher, 2000; James and Nordby, 2003; Jackson and Jackson, 2004; Lee et.al, 2001; White, 1999), forensic science evidence is potentially central to the successful detection of crimes but this potential is prejudiced by the failure of many investigators to collect or make use of physical evidence available at crime scenes. For example, Osterburg and Ward argue that: 'Unfortunately, for a variety of reasons, crime scene searches are conducted in only a few cases [...] Research indicates that most crime scenes contain much more physical evidence than is discovered' (2000: 523).

The increased collection and databasing of DNA in England & Wales, both from crime scenes and from individuals, has been the subject of continued debate in terms of its capability to support 'intelligence led' investigations, its capacity to deliver increased levels of detection, and its 'value-for-money'. The latter concern has been especially significant in shaping the policy agendas of Government which have supported the expansion of the database. The NDNAD has been a response to and (it might be hoped by its advocates) a vindication of public sector management initiatives designed to encourage cost-effective policing. The database is often publicly lauded as a super-efficient mechanism for identifying offenders and an effective means of acquiring the

evidence required for successful criminal prosecutions. Yet the complexity of measuring 'output' from the NDNAD, along with a continually changing set of criteria for statistically calculating its results, has meant that the proclaimed success of the database can still be open to contestation.

1.3 Public trust and the NDNAD

Alongside debates about the investigative usefulness of the sampling, profiling and databasing of DNA by the police, a range of critical comments have arisen in England & Wales and elsewhere regarding the ethical implications raised by the establishment of large collections of DNA profiles held in searchable archives. England & Wales has a legislative framework in place which gives powers to the police to take, retain, and use DNA samples and profiles taken from individual suspects (and volunteers) under an especially wide range of circumstances. The capacity to retain and use human tissue samples of those not convicted of (and in some cases not charged with) a recordable offence has engendered criticism across a wide range of commentators.

A recurring aspect of these comments has been the observation that the establishment and growth of the NDNAD is an instantiation of wider and far reaching changes in the modes of social control that exist in many contemporary Western European and North American societies. From this standpoint, these scientific and technological developments are seen as part of the 'new culture of crime control' which has both been informed by the political and cultural values of late modern society and has in turn come to shape the ways in which this society has installed '…more intensive regimes of regulation, inspection and control [whilst] our civic culture becomes increasingly less tolerant and inclusive, increasingly less capable of trust' (Garland, 2001: 194-5).

Understood this way, databased DNA profiles are contributions to a rapidly growing collection of knowledge about citizens, which is part of a 'bio-surveillance' apparatus to be used to detect the past, present and potentially future criminal conduct of profiled individuals. The NDNAD, as an ever expanding collection of genetic profiles, could be seen as one of a series of 'centres of calculation' (Latour, 1987) whose existence demonstrates the extensive and intense bureaucratic surveillance of individual subjects. In other words the NDNAD is just one example of a multiplicity of ways in which modern forms of government seek and use knowledge about their citizens (see for example Lyon, 1991 & 2001; Lyon and Zuriek, 1996; Marx, 2002; Norris and Armstrong, 1999; Norris, Moran and Armstrong. 1996). It is for this reason

that some critics of the NDNAD argue that the extension of police powers to take, retain, and speculatively search a large and expanding collection of DNA profiles is disproportionate despite the legitimate public interest in the investigation of crime. This view has found legal expression, in *R v Marper & S* (2002a, 2002b, 2004), which uses the Human Rights Act (1998) to argue that the retention and subsequent use of an unconvicted person's DNA is both a disproportionate breach of their right to privacy and also a discriminatory activity.

Most critical commentaries on the developing use of DNA profiling and databasing raise important issues of public confidence in the intentions and actions of those who are empowered to collect and use genetic material in the ways described above (O'Neill, 2002). Four substantive topics have recurred throughout the wide range of academic and other writings on these matters and, for most of these, what is at issue is not the methods used by the police to investigate those whose account they distrust but the trustworthiness of police actions themselves.

The first criticism is that, as relevant technologies develop, the analysis of genetic samples held by the police may not remain restricted to currently designated 'non-coding' areas of the human genome, but will expand to consider various other forms of information that may be derivable from these samples. Included amongst such possibilities are: genetic risk factors, phenotypical information, and 'genetic ancestry'. Secondly, there is a concern that the lawful authority of the police to take samples under a variety of conditions (including both consensual and non-consensual ones) should not be used to coerce or deceive individuals. As O'Neill (2002: 107) puts it: 'If consent procedures are inadequate, or if public authority is exercised for purposes that are not essential or in ways that do not command trust, obtaining genetic profiles will be ethically suspect'. Thirdly, it is contended that however 'uninformative' current genetic profiles are, it is vital to public confidence in the applications of this technology that such genetic information is held securely and confidentially and is made available only to other agencies authorised to share it under clearly specified arrangements. Finally, it is argued that both routine uses of this technology, and research which seeks to further develop its capacity and application, must be subject to adequate independent scrutiny, especially though the establishment of mechanisms of governance which provide for expert and external oversight of the working of the NDNAD.

All of these are intricate social and ethical issues that are made more complex by the necessity to consider the implications of: the different sources of the genetic material in question (crime scenes, compulsory samples from the unconvicted and convicted, samples from various kinds of volunteers); the different rules for their searching (against particular crime scene samples or against all incoming crime scene and individual samples); and the differences in what is retained (profiles and/or the biological samples).

1.4 Conclusion

Our aim in this chapter has been to provide a brief overview of the ways in which the NDNAD is used by the police to support the investigation of both serious and volume crime. We have paid particular attention to the capability of the NDNAD to enable speculative searching of both crime scene and CJ profiles. These uses of the NDNAD raise a number of questions about the investigative usefulness and ethical viability of this large collection of samples and profiles. In the following chapters we will contextualize and address these questions in relation to the development, current use, and future directions of the NDNAD.

Chapter Two

Developing and Applying DNA Profiling in the UK

2.1 Introduction

In this chapter we consider the early application of DNA profiling in criminal investigations in England & Wales and the subsequent establishment of its evidential authority in prosecutions. The initial contribution of DNA evidence to prosecutorial case work, as well as the early recognition which the technology gained in civil paternity disputes, were fundamental in ensuring the speedy acceptance of DNA profiling as a robust, reliable, and credible instrument suitable for use within the criminal justice system as a whole.

2.2 Scientific innovations and investigative applications

The initial development of technologies for capturing and displaying individual differences based on repeat sequences in DNA was carried out by Alec Jeffreys and his colleagues at the University of Leicester. Studies in the mid-1980s (Gill et al. 1985; Jeffreys et al. 1985) established that samples taken from several different biological sources (including blood, semen, saliva, hair, dandruff, skin, vaginal and nasal secretions, sweat and urine) could contain sufficient high quality DNA to enable profiling to take place. These novel DNA methods had a number of important advantages over previous identification technologies based on the analysis of blood types: DNA is more resistant than protein markers to degradation through time or heat; DNA is found in all cells, so the amount of potentially analyzable material is widened; only very small samples are required, and, perhaps most importantly, the individual variability detected by DNA analysis is much greater than that measurable by comparison of protein polymorphisms. This means there is far less chance of two people having the same set of markers and enables much larger populations of individuals to be analysed without the possibility of them having the same profile.

Initially, profiling was based on one class of DNA sequences: restriction fragment length polymorphisms – variable number tandem repeats – that comprise sequences

of 8 to 80 DNA base pairs repeated in tandem for different numbers of times in different locations in the genome. However, despite the significant advantages offered by genetic analysis, there remained a number of important technical limitations which restricted the potential applicability of this method to a relatively small number of criminal investigations. These included: the need to obtain relatively large quantities of DNA to undertake analysis; the process was time-consuming (taking several days or, in some cases, weeks); it was unsuitable for use with degraded samples; only a limited number of genetic markers could be analysed simultaneously; and few samples could be processed at any one time. Nevertheless, the first highly prominent deployment of these innovative technologies in criminal investigations occurred only two years after Jeffreys' initial – and largely adventitious – laboratory discoveries.

2.2.1 The Pitchfork case

This first investigative use of DNA profiling by the police in England & Wales was in Northamptonshire in 1986 during the investigation of the rape and murder of fifteen year old Dawn Ashworth. Blood typing of semen recovered from Ashworth's body linked it to semen obtained from the body of another woman, Lynda Mann, who, in 1983, had also been raped and murdered. At the time of Mann's death the recovered semen sample showed it to have features common to one in ten men in the population (a Blood Group A secretor with a strong phosphoglucomutase (PGM) 1+ enzyme). This excluded the first chief suspect, Mann's stepfather. Subsequent investigations proved inconclusive until the rape and murder of Ashworth three years later.

Whilst the prime suspect in the Ashworth case, seventeen year old Richard Buckland, confessed to Ashworth's murder two aspects of the confession were immediately problematic: first, Buckland was not Blood Group A which meant that he could not have produced the semen recovered from Ashworth's body; second, despite his confession of the murder of Ashworth, he denied involvement in Mann's death. Faced with these contradictions, the police asked Alec Jeffreys to extract and analyze DNA from both semen stains recovered from the bodies of Mann and Ashworth and compare them to a DNA profile obtained from Buckland's blood sample. Jeffreys, and subsequently Peter Gill from the FSS, carried out separate examinations of the samples and reached the same conclusions: Buckland's DNA profile did not match the crime scene profile, but the profiles obtained from each crime scene semen samples

matched each other. On this basis, Richard Buckland was exonerated and cleared of all charges.

The police then began the first mass DNA screening in January 1987 by collecting blood samples from men aged between ages 16 and 34 who lived in villages surrounding the crime scenes. In fact there were several problems with this approach which hindered the speedy identification of a suspect. Canter (1995: 20) described the screening as 'indiscriminate' and argued that sampling large numbers of individuals without narrowing the target population (for example through 'behavioural analysis'), limited the effectiveness of this first instance of mass screening. By April 1987 the police had taken 4,000 samples of blood - obtained using subcontracted doctors - and the FSS had carried out DNA profiling on all samples matching the blood type identified from the crime scene semen.

One sample which the police collected was from Ian Kelly. When Kelly provided the sample he gave his name as Colin Pitchfork (and used Pitchfork's passport, with an altered photograph, to support this impersonation). Pitchfork had instigated this subterfuge in order to avoid submitting a sample of his own blood for DNA profiling, but several months later Kelly voluntarily admitted his dishonesty and the police arrested both men. On arrest Pitchfork quickly confessed to the murder of both Mann and Ashworth. Subsequent profiling of Pitchfork's DNA produced a conclusive match with DNA from the semen recovered from both bodies. He was convicted and sentenced to life imprisonment in 1988.

The 'identification' of Pitchfork was a defining moment in the application of DNA profiling within policing yet it is clear that, despite its enthusiastic use, its practical application was not straight-forward. The investigation raised a number of questions about the viability of the technology in terms of the value of DNA evidence in relation to other evidence types, the collection issues raised by the extraction of samples from crime scenes and from individuals, and the problems associated with mass (intelligence-led) screening. Indeed, the central feature of the case – Pitchfork's initial evasion of the mass screen – is an example of an important feature of the use of DNA profiling which still causes concern for investigators: the problem of linking genetic profiles found at crime scenes to individual suspects. As we explore in the next chapter, the NDNAD is at the centre of the response to this problem.

2.2.2 Early case work

The Pitchfork case was one of several early instances in which DNA profiling played an important role in police investigations. By 1987 the Biology Division of the Central Research and Support Establishment of the Home Office Forensic Science Service, a group concerned mainly with serious offences against persons (such as rape, wounding and homicide), was carrying out a major DNA initiative with a remit to consider three principal issues: first, how to assure the rapid adoption of DNA profiling, under controlled conditions, into case work analysis; second, how to provide training to operational staff in order to ensure that such casework could be successfully undertaken; and third, to make research and development of DNA profiling a priority. In 1987 the division focused its whole attention on DNA profiling and by the beginning of 1988 its work was dominated by the analysis of DNA submissions from the police forces of England & Wales. By July 1988, 200 cases had been processed by the division and DNA profiling was already being recognized as centrally important to current and future FSS activity (Home Office, 1988).

These early applications of, and research developments in, DNA profiling involved the successful combination of highly specialized scientific techniques within innovative police investigations. DNA profiling quickly established itself as an authoritative investigative tool and an important prosecutorial resource in England & Wales. The commitment of the Home Office to fund research into DNA profiling made possible the FSS development of robust systems for effective DNA casework. Yet to achieve this, the Home Office had to acquire the technology from the original patent owners, The Lister Institute of Preventive Medicine, which had previously granted an exclusive licence to ICI for the commercialization of the technology. By appropriating the technology through Crown Privilege the Home Office avoided the financial burden of using an external body to undertake, what was then, costly casework analysis and also facilitated the growth of their own laboratory facilities in an economical way.

In 1988, prosecutions in which DNA evidence was presented demonstrated that, despite challenges to the interpretation of DNA profiling by defence counsel, judicial responses were sufficiently positive for the FSS to claim that 'the technique itself seems to have been accepted' (Home Office, 1988: 9). A major concern of the FSS was to establish an acceptable and standard method for the presentation of evidence in court and specific attention was given to the statistical construction of match probabilities and their presentation to jurors. The result was that a 'nationally agreed

form of words was devised for describing chance associations from 1:200 to 1 in many millions' (Home Office, 1988: 10).

2.3 Evidential uses of DNA

The reputation of forensic science in England & Wales was at a low point in the early 1990s. During the preceding years seven significant miscarriages of justice, involving successful appeals against convictions for terrorism and serious offences against the person, were dealt with by the Court of Appeal: John Preece; 'The Birmingham Six'; 'The Maguire Seven'; 'The Guilford Four'; Stefan Kiszko; Judith Ward; and 'The Tottenham Three'. It was against this background, and in particular the case of The Birmingham Six, that the government announced the establishment of a Royal Commission on Criminal Justice in 1991. The Commission's remit was to undertake an extensive examination of the criminal justice system from the point at which an individual is arrested, through the investigative process and the collection of evidence, to the prosecution of an individual in court. The remit was wide and the subsequent recommendations were far reaching.

In fact, the report by the Royal Commission on Criminal Justice (1993) was preceded by the House of Lords' Select Committee on Science and Technology report, 'Forensic Science' (1993), which had already examined the current arrangements for the provision of forensic science in England & Wales. The Select Committee wanted to establish the 'true picture' of forensic science and deal with the 'image problem' which they argued depicted the forensic scientist as 'a policeman in a white coat' 1193: 14-15). The Select Committee defended the expertise and impartiality of forensic scientists across the country, arguing that in the seven cases mentioned above only three had involved scientific evidence and that even here, fault lay in the use of practices that had already been replaced. Their main finding was that the quality of service provision of forensic science in the England & Wales was high and they urged public confidence in it.

As part of the Select Committee's consideration of forensic science they briefly examined DNA profiling and posed four key questions. First, whether the courts do, and should, accept the validity of such novel scientific evidence? Second, how do statements of probability derived from DNA relate to the traditional concept of 'reasonable doubt' in judgements of innocence and guilt in criminal cases? Third, what are the circumstances under which bodily samples should be taken and retained by the police? Finally, under what circumstances may a DNA profile be retained in

either an 'identified' or 'anonymous' form on a computerised database and who should have access to it?

The first two of these questions resonate with a large number of subsequent academic studies of the legal and technical issues that surround the presentation and evaluation of forensic evidence in judicial proceedings and the relationship between scientific expertise and judicial decision-making, (for example, see: Callen, 1997; Edmond, 2000; Freeman and Reece, 1998; Jones, 1994; Redmayne, 2001; Roberts and Willmore, 1993), the probative significance of forensic science evidence in general (for example, see: Allen and Redmayne, 1997; Foreman et al., 1997; Robertson and Vignaux, 1997), and issues surrounding the presentation and evaluation of DNA evidence in particular (e.g. Coleman and Swenson, 1994; Evett and Weir, 1998; Lynch, 1998; Thompson, 1997).

What these and other studies remind us is that the judicial acceptance of forensic DNA technology was not simply secured by scientific authority or by legal fiat, but rather by organisational responses to legal challenges which 'spurred the formation of new testing methods and agencies, as well as the standardization of commonly used tests' (Jasanoff, 2001b:13620). Scientific technologies become embedded in legal proceedings through the negotiation and adaptation of their innovators and users, and this is well illustrated by the contestation and contingency surrounding the early use of DNA evidence in criminal case work. Whilst these contests were more muted in the UK than in the USA, the following sections of this chapter indicate some ways in which they appeared and were resolved.

2.3.1 The presentation of evidence: the 'prosecutor's fallacy'

Questions raised by the House of Lords Select Committee in 1993 about the statistical calculation of match probabilities during the presentation of DNA evidence in court revealed significant points of tension within English jurisprudence. Despite the efforts of the FSS to standardise the statistical presentation of evidence a problem arose in two criminal cases, heard in the Court of Appeal in 1994. Both cases – *R v Deen (1994)* and *R v Gordon (1995)* – were appeals that challenged the presentation of DNA evidence in original trials; the appeals were successful and the cases ordered for re-trial. Both appellants were arrested during a single investigation of a series of rapes, although they were charged with having attacked different victims

In *R v Deen* the central point of appeal was the statistical presentation of evidence to the jury. At Deen's original trial the DNA 'match probability' was presented as one in three million. The evidence was given to the court in the following manner:

> Counsel: So the likelihood of this being any other man but Andrew Deen is one in three million?
> Expert: In three million, yes.
> (quoted in Redmayne, 2001: 58)

The central problem was an ambiguity between the probability that the defendant's DNA matched the crime scene profile and the probability that the defendant was the person who left his DNA at the crime scene. The first statistical calculation is based on the random match probability – that is, the probability of finding anyone else within a defined population that has the same profile as the defendant. In contrast, the second calculation, and the one that was used in court, is based on the concept of the 'likelihood' that Deen committed the crime. The problem, in the above presentation, is that the first calculation (of match probability) is used to answer a question about the likelihood of Deen's guilt. This problem with the statistical presentation of evidence has since become known as 'the prosecutor's fallacy' and is based on a misconception – not always deliberately created by the prosecution – that a random match probability is the same as a likelihood ratio.

2.3.2 Laboratory failures

In *R v Gordon* contentions about the presentation of statistical reasoning were accompanied by a challenge to the technical competency of the DNA profiling method. This has remained a rare instance of a dispute over the technical and scientific credibility of DNA profiling in the UK. Gordon's original conviction was based on DNA evidence which, presented by the Crown at his trial, was said to establish a match between profiles obtained from two crime scenes samples (semen taken from two women who had been raped) and that obtained from Gordon's reference sample.

In Gordon's appeal two arguments were made in rebuttal of this trial evidence. The first was that the methodology used in producing the DNA match was faulty. At the time of Gordon's original trial a match between DNA profiles was declared following the comparison of a series of 'bands' of DNA fragments visible at particular – and different – places on the radiographic representation of each separate genetic sample.

Gordon's counsel contended that, whilst the series of bands obtained from each crime scene semen sample matched exactly, only one of a series of bands matched those of the appellant. Counsel argued that there must be a mismatch because, since the rapes were shown to be committed by the same person, if Gordon did not match both rape scenes he could not have committed either.

The 'mismatch' argument arises from the fact that the original match had been made using a methodology which incorporated a degree of measurement error between the bands that together made up each profile. This margin of discrepancy was commonly accepted among scientists on the basis that random variations occurred in the DNA length measurements represented by the bands each time the procedure was carried out. Gordon's counsel contended that the degree of discrepancy was higher than the 'window' of variation commonly agreed. In the appeal hearing this was acknowledged to be the case but the scientist responsible for the profiling stated that the previous criteria for variation had been too strict and, therefore, the profiles could still be considered to match.

Gordon's second point of contention was based upon an anomalous reading found in the 'control track' positioned in the centre of the gel during electrophoresis. This control track (designed to measure the accuracy of the process) produced results which did not accord with the previous known readings of that sample. The scientists concluded that this was an anomaly created in the central track due to a temperature variation which would have left the outer tracks (containing Gordon's DNA) unaffected. Subsequent evidence showed that such an assertion was unfounded, given that no controlled experiments on the differentiation between tracks had been undertaken.

Because of these variations Gordon contended that the statistical calculation of the match probability presented to the court was based on technically inaccurate and inadequate profiling. The Court considered that due to variations in the profiling technique it was not possible to reach satisfactory statistical conclusions about match probabilities and concluded that:

> We do not doubt the validity and value of DNA evidence in general. However, in our view, the effect of the evidence in the present case was to raise some arguable questions on whether the match probabilities put to the jury and summed up to them […] could properly be sustained. Figures running into

> millions of the kind put before the jury have a dramatic quality which may exert a strong influence upon them (R v Gordon, 1995).

The problems raised in *R v Gordon* have since been resolved by a change in profiling technology and, more importantly, the move from a reliance on visual comparisons to computer supported measurement. Yet the issues associated with the presentation of statistical evidence to juries recurred in two further significant cases.

2.3.3 Statistical presentation of evidence

R v Deen demonstrated that the confusion between likelihood ratios and match probabilities can result in misleading statistical assertions in court. Yet, as Redmayne (2001) argues, this is often because likelihood ratios are themselves extremely difficult for a jury to understand. This was apparent in two successive appeals made by Dennis John Adams in the Court of Appeal (*R v Adams*, 1996 & 1998). The case against Adams, for rape, was based wholly on DNA evidence (something which has remained unusual because of a 'precautionary principle' which has stressed the need to use DNA only where corroborating evidence is available). He was convicted on the basis of a match probability of 1 in 200 million. At Adams' original trial his defence introduced a Bayesian likelihood ratio to show how unlikely it was, despite the DNA evidence, that Adams had committed the offence.

In Adams' case the DNA match was the only evidence the prosecution presented. Nevertheless, two other pieces of evidence favoured Adams' defence: first, the victim failed to identify Adams in an identity parade and subsequently stated at a committal hearing that he did not look like the attacker; secondly, Adams had an alibi (supplied by his girlfriend). The defence, in directing the jury to a Bayesian calculation of Adam's guilt, sought to require a consideration of the significance of these other items of evidence alongside that of the DNA profile match. They also proposed a Bayesian approach to this consideration according to which probabilities can be assigned to the occurrence of each evidential item on the basis of the two hypotheses of innocence and guilt. The two resulting summary probabilities are expressed as a 'likelihood ratio' to support a verdict of guilt or innocence. This method did not persuade the original trial jury and Adams was convicted. Adams appealed on the grounds that the trial judge had failed adequately to direct the jury in how to perform this line of reasoning and, therefore, that his conviction was unsafe. His appeal was allowed and he was retried and convicted again. Adams appealed on the same grounds for a second time.

The Court, on hearing Adams' second appeal, dismissed it. The use of this form of statistical reasoning was strongly deprecated, echoing the judgement of the earlier appeal: 'To introduce Bayes Theorem, or any similar method, into a criminal trial plunged the jury into inappropriate and unnecessary realms of theory and complexity deflecting them from their proper task' (*R v Adams*, 1988: 384). Steventon has subsequently argued that:

> In *Adams*, the defence were too ambitious in their assessment of what the jury could reasonably be expected to understand. The most important message that they were trying to portray concerned the link between the prior odds, the likelihood ratio and the posterior odds; on reflection this could be achieved verbally rather than numerically and it may be more acceptable to the courts (1998: 184).

Yet Redmayne (2001) argues that the translation of statistical formulations into verbal statements is also inadequate and that it remains an unhelpful way of presenting evidence to jurors. His assessment is based on a wider consideration of how jurors process and consider the multiplicity of evidence in a criminal case; jurors do not, he argues, formulate evidence in relation to the probabilistic model offered by Bayesian theory. Redmayne argues that it is not that jurors cannot learn Bayesian calculations but that they are not trained in how to integrate those calculations within their usual methods of determining innocence or guilt. A similar view, more prosaically put, was offered by one of the appeal judges during the second Adams appeal when he distinguished between a *statistical approach* and a *normal approach* of reasoning (asserting the view that juries follow 'naturalistic' patterns of reasoning rather than mathematical formulae).

The problem with likelihood ratio calculations, therefore, is that they demand a degree of expert reasoning which is problematic for jurors. For this reason it is match probabilities, or 'frequency calculations', that have become the preferred method for the statistical presentation of evidence within court. In a ruling by the Court of Appeal, in the case of *R v Doheny & Adams* (1996), the Court made specific recommendations for how such frequencies should be presented in order to avoid confusion and lend appropriate weight to the forensic evidence. They argued that:

> The scientist should not be asked his opinion on the likelihood that it was the Defendant who left the crime stain, nor when giving evidence should he use

> terminology which may lead the Jury to believe that he is expressing such an opinion (*R v Doheny & Adams,* 1996).

The Court of Appeal also outlined a standard textual template for the presentation of DNA evidence to a jury:

> Members of the Jury, if you accept the scientific evidence called by the Crown, this indicates that there are probably only four or five males in the United Kingdom from whom that semen stain could have come. The Defendant is one of them. If that is the position, the decision you have to reach, on all the evidence, is whether you are sure that it was the Defendant who left that stain or whether it is possible that it was one of that other small group of men who share the same DNA characteristics (*R v Doheny & Adams,* 1996).

This template enshrines the idea that DNA evidence should not be regarded as providing a definitive match between a suspect and a crime scene *or* a method of calculating guilt. Rather, DNA evidence may be treated as a method for calculating the probability that a suspect was present at a crime scene from which, in relation to other forms of evidence, it is possible to formulate a verdict of innocence or guilt.

Whilst this template has become the basis for the now routine presentation of DNA evidence in court, Redmayne (2001) contends that there are inherent problems in using frequencies in this way. First, the description of match probability tends to convert expectation into precise figures because it leads the jury to believe that probabilistic calculations of match occurrences are factual. Secondly, if the match is calculated as a small probability, for example 1 in 200 million, it is difficult to argue that there is another suspect available in the population other than the accused. Thirdly, the choice of the suspect population used to calculate the match is open to question (the judge in *Doheny & Adams* suggested the 'Caucasian sexually active males in the Manchester area' as the relevant population basis for the calculation of statistical probability, which is a population whose numbers would be difficult to calculate with any degree of certainty). Finally, unlike likelihood ratios, match probabilities tend to allow DNA evidence to outweigh other forms of evidence.

2.4 Conclusion

Our aim in this chapter has been to show how DNA profiling was established as an authoritative and robust tool for both investigative and prosecutorial purposes. The

combination of the initial successful police applications and its acceptance in court as reliable evidence meant that, by the early 1990's, DNA profiling was established as a key forensic technology. In relation to the evidential problems which we have described above it is important to remember that these cases are rare examples of challenges to DNA evidence. They are important because as individual and isolated incidences they highlight both a conspicuous lack of legal objections to DNA evidence in England & Wales and the speed at which evidential problems were resolved. This was of central importance for the future establishment and operation of the NDNAD and, as we argue in the next chapter, provided the foundations of credibility and reliability on which to incorporate DNA profiling into routine police work.

Chapter Three

Making the National DNA Database

3.1 Introduction

In the previous chapter we considered the origins and development of the forensic uses of DNA profiling from the mid 1980s and described the reception and rapid acceptance of DNA evidence in judicial proceedings. In this chapter we give explicit attention to the establishment of forensic DNA databasing within England & Wales in the form of the NDNAD. The character and uses of the NDNAD have been fashioned during a relatively short period of time in which a series of inter-related scientific, governmental and policing innovations have encouraged the now routine investigative use of a database comprising over two million profiles. The existence of a national DNA database in England & Wales is neither the inevitable outcome of either developments of the technology of DNA profiling nor its successful application to criminal case work by the police. Rather, the NDNAD is the purposeful creation of successive policy makers and legislators who have sought to harness the capacities of molecular biology to support important governmental ambitions in relation to the detection and reduction of crime.

3.2 Technological innovation and legislative requirements

The early adoption and development of DNA profiling by the FSS and its use in criminal investigations by the police demonstrated the effectiveness of its deployment on a case-by-case basis. Yet the most important aspect of this technology for crime investigation was quickly recognized to lie in the potential to create a database of profile records capable of being compared with any previously or newly obtained profiles. As we argued in the previous chapter, the Pitchfork case demonstrated that the successful use of the technology depended upon the scope and coverage of the collection of reference profiles to which crime scene samples could be compared. In this first use, comparison was only made possible by a long and costly process of mass screening – something which itself proved, through Pitchfork's initial evasion, to be a problematic method for aiding criminal detection. It is therefore not surprising that

the idea of a creating an 'index' of DNA profiles, capable of being searched against crime scene stains, was considered soon after these early applications. The FSS first recorded their interest in such a development in 1988:

> A procedure has been developed to facilitate research into the storage and manipulation of the results of DNA analysis by computer. In conjunction with Foster and Freeman Limited a video camera has been coupled to a microcomputer and software produced that allows the user to store data effectively. The software also allows additional data to be compared with that already held and, in addition, frequencies of the incidence and chance co-migration of bands can be obtained. The system is interactive and should be very 'user friendly' in its final form (Home Office, 1988: 11).

Research into developing a database was therefore in place just two years after the first large scale use of DNA profiling by the police. Whilst the form of this database was limited by the available technology, the potential of this new type of contact trace material was being carefully explored.

The House of Commons Home Affairs Committee, who undertook a systematic assessment of the Forensic Science Service at the end of the 1980s, argued that the development of such a 'DNA index' was highly desirable for both the prevention and detection of crime and the robust authority it could lend to forensic science. As we argued in the previous chapter, the context for this enthusiasm was a criminal justice system in which some applications of forensic evidence in court had damaged public confidence in its reliability. There were also complaints by the police about the quality and the timeliness of forensic science support to investigators. Against this background the Home Affairs Committee argued that the 'potential of the test in criminal investigation is immense' and that 'DNA profiling represents the opportunity for [a] great advance in forensic scientific detection' (HC Paper 26-I, 1989: xxxii). In view of this, the Committee argued that:

> It may be still too early in the development of DNA profiling to contemplate an index of DNA profiles, in the same way as a register of fingerprints is kept, because the technology is advancing so quickly that the service does not want to be locked into obsolete methodology. Once a method of encoding DNA profiles has been established, the information derived from DNA testing could

> be retrieved, provided that the expensive computer equipment was available (HC Paper 26-I, 1989: xxxii).

As well as recognizing the need to await the development of a technological platform capable of supporting a DNA archive the Committee also identified a 'number of legal problems to be overcome before an index of DNA profiles can be contemplated' (HC Paper 26-I, 1989: xxxii). These 'legal problems' related primarily to the legislative framework through which the police were empowered to obtain a DNA sample from an individual suspect without their consent and subsequently to store it for future use. With no such legislation in place in 1989 the Committee recommended that:

> It is important that the police and the Forensic Science Service should be prepared to use the technique and should preserve any information which is gathered from persons subsequently convicted which may be of use in any future index of DNA profiles (HC Paper 26-I, 1989: xxxiii).

The Government response was affirmative:

> Work is underway to establish a framework for developing a data base of DNA profiles. This will involve resolving various scientific and technical problems and will require national and, if possible, international technical agreement on a range of technical issues. The possible creation of a DNA database also raises important legal and ethical questions. The Select Committee's recommendations will be borne in mind in carrying this work forward (CM 699, 1989: 8).

3.3 A legislative framework

The governmental ambition to establish a DNA database raised significant legislative questions about how to facilitate the lawful collection and use of DNA samples and profiles by the police. In fact, the NDNAD was not made by any single legislative instrument but facilitated piecemeal by successive amendments to previous legislation, in particular the Police and Criminal Evidence Act (PACE) (1984). Three distinctive elements now characterize this progressively 'layered' set of PACE amendments: first, changes in measures which allow the police to take CJ samples from individuals; second, changes in the provisions which allow the police to retain CJ samples and profiles; and third, changes in the powers granted to the police to speculatively search all retained profiles.

3.3.1 Criminal Justice sampling

When DNA profiling was first used by the police in England & Wales, PACE provided the framework under which samples could be taken from individuals. That legislation differentiated between 'intimate' and 'non-intimate' samples. A non-intimate sample was defined as a sample of hair other than pubic hair, a sample taken from a nail or from under a nail, a swab taken from any part of a person's body other than a bodily orifice, a footprint or a similar impression of any part of the body other than a part of the hand (fingerprints were treated separately). An intimate sample, which could not be taken without consent, was defined as a sample of blood, semen or any other tissue, fluid, urine, saliva or pubic hair, or a swab taken from a bodily orifice. Only non-intimate samples could be taken without consent, and even then only when a senior police officer had reasonable grounds for believing that the sample would yield significant information relevant to the person's possible involvement in crime.

Since DNA profiling initially relied on the analysis of blood samples, limitations on judicial powers to compel suspects to provide such samples were seen to be problematic. The Home Affairs Select Committee (1989) recommended that Courts should possess the power to order compulsory blood sampling of suspects (pursuant to the Magistrates Courts Act 1980) in cases of serious offences. Although subsequent legislative developments have not relied on the need to allow police to obtain judicial authority to collect blood samples (because blood samples themselves have become unnecessary), the Select Committee's recommendation highlights the early attention given to the issue of non-consensual DNA sampling by the police.

The first systematic consideration of the extent to which the police should be enabled to obtain DNA samples was undertaken by the Scottish Law Commission in 1989. In Scotland, DNA profiling had already been successfully used in a number of criminal prosecutions (see, CM 572, 1989: 2) and was also being utilized to settle paternity disputes in civil hearings. In the context of criminal investigations the Scottish Law Commission affirmed the recommendation from the Home Affairs Select Committee that Courts should be empowered to order non-consensual blood testing (in Scotland, courts were already able to issue warrants affording the police the power to obtain intimate samples without consent).

Yet whilst the Scottish Law Commission supported the collection of samples from certain suspects under particular conditions they also argued for restrictions on police powers. For instance, the Commission recommended that the police should not be

given powers to take samples without consent where this 'involves going inside a person's body' (CM 572, 1989: 12). They recommended what they described as a 'halfway' approach – between fingerprinting (which they recognized as non-invasive) and blood sampling – to enable the police to obtain samples from plucked hair or swabs from external parts of the body. They argued that 'any invasion of bodily integrity in the taking of samples of the type we are considering is minimal. This is not to say that the taking of a sample from a person's body is a matter to be treated lightly. It is most certainly not. But it must be kept in perspective' (CM 572, 1989: 10).

It is important to recognize that the legislative framework which has since been developed to enable non-consensual CJ sampling in England & Wales was, at the end of the 1980s, already in place in Northern Ireland. A crucial difference in the legislative provision for sampling in Northern Ireland, and in contrast to the rest of the UK, was the designation of samples obtained from a swab inside the mouth, or saliva samples, as 'non-intimate' (Police and Criminal Evidence [Northern Ireland] Order 1989). This procedure, which allowed a 'buccal scrape' to be used to obtain epithelial cells from inside the mouth, was considered as intimate in England & Wales.

3.3.2 The Royal Commission on Criminal Justice

The Royal Commission on Criminal Justice (1993) published its findings and recommendations after a comprehensive assessment of the collection and use of evidence across the whole criminal justice system. It was underpinned by 22 commissioned research studies which dealt with different aspects of the criminal justice process. Three of these studies focused, in whole or in part, on the forensic analysis of biological material and the uses of this analysis in criminal investigations and prosecutions. Robertson (1992) looked at the role of forensic medical examiners; Roberts and Willmore (1993) examined the construction and use of expert scientific evidence in criminal prosecutions; and Steventon (1993) assessed the capacity of defence lawyers to challenge DNA evidence. The final report of the Commission contained recommendations which directly influenced the Criminal Justice and Public Order Act (CJPOA) (1994).

The Royal Commission made several recommendations that were important in the subsequent trajectory of the police uses of DNA and the development of the NDNAD. The first of these was a reconsideration of the categories of intimate and non-intimate samples in England & Wales. Specifically, they recommended that swabs taken from the mouth, and hair (other than pubic hair) plucked from the body, should be

reclassified as non-intimate rather than intimate samples. The Commission advised that:

> DNA profiling is now so powerful a diagnostic technique and so helpful in establishing guilt or innocence, we believe that it is proper and desirable to allow the police to take non-intimate samples (e.g. saliva, plucked hair etc) without consent from all those arrested for serious criminal offences, whether or not DNA is relevant to the particular offence (1993: 16).

This recommendation contains three important elements. The first is the proposal to allow the police to take certain reclassified non-intimate samples without consent. The second is the suggestion that the police be empowered to obtain such samples in instances of 'serious criminal offences' - although it was further suggested that 'as soon as resources, with or without advances in technology, permit, we recommend that the category of serious arrestable offences be extended to include, for this purpose only, assault and burglary' (1993: 15). A third element of the recommendation is that the police be allowed to obtain a non-intimate sample regardless of its relevance to the investigation in question. This marks a significant shift from the sampling provisions implemented by PACE and must be seen as the first recommendation supporting the collection of DNA for the purposes of databasing rather than simply for individual casework.

In making these recommendations the Royal Commission acknowledged that changes in the law on the collection and storage of samples were necessary 'so that, in any subsequent investigation where the identity of the offender is unknown but DNA evidence comes to light, that evidence can be checked against the samples in a data base' (1993: 15). Whilst invoking an explicit comparison with fingerprint databases, the Commission recognised an important difference between the two biometric technologies by supporting a further proposal that profiles derived from all samples collected by the police (regardless of their subsequent legal standing) also be retained for the purposes of constructing a 'frequency database' capable of providing the necessary means of estimating match likelihood ratios. The Commission therefore recommended the establishment of two data sets: one set of samples and profiles retained from those convicted, to be used for future identification; and a frequency data set, comprising only numerical data from both the convicted and unconvicted, to be held on a separate database, overseen by an independent body, and to be used for statistical assessment but not directly for the further investigation of crime.

3.4 Criminal Justice and Public Order Act 1994

In February 1994, Home Secretary Michael Howard, announced the 'first step' towards a national DNA database with the decision to support the FSS and the Metropolitan Police Forensic Science Laboratory in a pilot study to investigate the IT, laboratory, and policing implications of collecting, processing, and storing samples on a database. In the same year the Government enacted the Criminal Justice and Public Order Act (CJPOA) which extended police powers to sample and use DNA in two central ways: first, by affording the police greater powers to obtain and retain CJ samples and, secondly, by making specific provisions for the speculative searching of the profiles derived from such samples.

3.4.1 Powers to sample and retain

A central, and far reaching, aspect of the CJPOA was the new framework it created for the police administration of DNA sample collection. In line with the Royal Commission's recommendation, the CJPOA redefined mouth samples as non-intimate and empowered the police to take them without consent. Yet the amendments to PACE made by the Act went beyond the suggestions of the Royal Commission by permitting non-intimate samples to be taken without consent in connection with the investigation of any 'recordable offence' (as opposed to 'serious offence'). An obvious effect of this was an immediate widening of the 'pool' of criminal suspects from which CJ samples could be taken.

3.4.2 Speculative searching

The capacity of the NDNAD, to produce 'cold hits' between a newly obtained crime scene profile and an already databased individual, or *vice versa*, results from powers afforded by the CJPOA to continuously speculatively search the set of records in the archive. The ethical issues that arise from speculative searching are far reaching and, as we show in Chapter Six, some commentators have called for restrictions upon the power of the police to undertake this routine practice. Yet, for the purposes of ensuring the effectiveness of the NDNAD, the automated speculative and continuous searching of DNA profiles has become axiomatic.

3.5 Extending the geographic and temporal reach of the NDNAD

After the NDNAD went live on April 10th 1995 it was quickly populated with DNA profiles obtained from crime scenes and from CJ profiles taken from those convicted of, or being prosecuted for, a recordable offence - 39,712 CJ profiles and 2881 crime

scene profiles were added in 1995/6 (for a full statistical breakdown of annual profile inclusion by the FSS see: NDNAD, Annual Report 2002-03). No data exist to assess the volume of profiles that were held by the police prior to 1995 although it is assumed to be a significant number. As specified by the CJPOA, CJ samples and profiles obtained from those suspects subsequently not convicted of a recordable offence were not retained on the NDNAD.

Very soon after the introduction of the NDNAD two significant pieces of legislation were enacted by Parliament. The first, the Criminal Procedure and Investigations Act (1996) (section 64), widened the power of the police to speculatively search samples and profiles taken from those who were arrested, charged or informed they would be reported for a recordable offence. The Act extended the power of the police to search profiles obtained across the whole of the UK (including Scotland, Northern Ireland, Jersey, Guernsey and the Isle of Man). In 1996 Scottish forces submitted samples and profiles directly to the FSS for inclusion on the NDNAD but have since established their own database (see Johnson & Williams, 2004). There is as yet no routine incorporation of samples or profiles into the NDNAD from Northern Ireland but it is expected that this will happen as soon as Forensic Science Northern Ireland acquire the necessary accreditation from UKAS.

A second piece of legislation was enacted by Parliament in 1997: the Criminal Evidence (Amendment) Act (1997). This Act extended the power of the police to take non-intimate samples without consent from a limited category of prisoners convicted before the CJPOA took effect. The legislation was designed to allow the police to collect DNA samples from those convicted of sex offences prior to 1994 to ensure their subsequent inclusion on the database. The introduction of retrospective sampling powers was justified by Government because of the serious nature of the offences under consideration.

3.6 The Criminal Justice and Police Act 2001

A further significant piece of legislation relating to the NDNAD since the CJPOA has been the Criminal Justice and Police Act (2001) (CJPA) which extended the powers of the police to retain and speculatively search the samples and profiles of those not convicted of a recordable offence.

3.6.1 Background to the CJPA

The background to the CJPA extension of police powers was the joint failure of the police service and the FSS to ensure the systematic removal of profiles from the NDNAD taken from those who were subsequently never convicted of criminal offences. A HMIC thematic inspection, *Under the Microscope* (HMIC, 2000: 16-18), recognized that a large number of samples and profiles – estimated at 50,000 but acknowledged to be perhaps higher – were currently being held on the NDNAD unlawfully. These samples, taken from suspects who were later not prosecuted or whose prosecutions failed, should have been destroyed and the profiles obtained from them removed from the NDNAD. When the NDNAD produced matches between CJ profiles that should have been removed (i.e. profiles of unconvicted persons) and newly entered crime scene profiles, this proved highly problematic for police investigations and prosecutions.

One of those high profile cases, *R v B,* in which the original prosecution relied on DNA evidence obtained using an illegally retained CJ profile, resulted in hearings in the Court of Appeal (*R v B*, 2000) and in the House of Lords (Attorney General's Reference No.3 of 1999). The background to *R v B* was the rape and assault of a 66 year old woman in her London home on January 23rd 1997. On March 20th 1997 the FSS produced DNA profiles from semen found on two swabs taken from the woman which were subsequently loaded onto the NDNAD on 15th April. On 4th January 1998, *B* was arrested in respect of an offence of burglary and a DNA sample was taken from him. The sample was received by the FSS for profiling on January 6th but not loaded onto the NDNAD until 23rd September, one month after *B* had been acquitted of charges of burglary. Under the provisions of the CJPOA, because *B* had been acquitted, the profile should not have been included on the database. However, when it was loaded, it matched the profile obtained from the swabs taken from the rape victim 20 months earlier.

B was arrested following police receipt of the DNA intelligence match and a prosecution followed. The trial judge ruled that, because the case rested on an initial detection by the police obtained using an illegally held sample and profile, the subsequent DNA evidence was inadmissible. The Attorney General contested this ruling in the Court of Appeal on 26th May 2000. The Court of Appeal considered the legislative framework for the retention and use of DNA samples, recommending 'a balance between the importance of investigating serious crime and convicting those who have committed serious crimes on the one hand and the rights and interests of

the citizens on the other' (*R v B*, 2000). Determining that the evidence submitted in *R v B* was based on an 'impermissible link' the Court stated that:

> It would have been perfectly possible for Parliament to conclude that the fight against crime was so important that there should be no restriction on the use of DNA samples, so that where such samples were lawfully obtained by the Police the information derived from them could be retained on a database for all purposes. […] [t]he [legislation] expressly and without qualification forbids the use of the sample which is required to be destroyed either in evidence or for the purposes of investigation (*R v B*, 2000).

The subsequent judgement of the House of Lords, who deemed the Court of Appeal ruling 'contrary to good sense', contended that such an 'austere' interpretation of the legislation unnecessarily limited the power of the police to investigate, and the Crown Prosecution Service to prosecute, an individual where compelling evidence was available. The House of Lords judgment coincided with the recommendation from HMIC that 'in the general interest of crime detection and reduction' it was time to 'revisit the legislation to consider whether all CJ samples, provided they have been obtained in accordance with PACE, should be retained on the NDNAD to provide a useful source of intelligence to aid future investigations' (HMIC 2000: 18).

3.6.2 The CJPA and the 'active criminal population'

The extension of police powers afforded by the CJPA was not simply aimed at rectifying individual anomalies created by existing DNA retention. Rather, this development reflected a more general policy ambition first expressed during 2000. When Prime Minister Tony Blair 'hailed an acceleration in the high-tech drive against crime, with the major expansion of the police DNA database used to hunt down criminals', he made a firm commitment to utilize this 'vital weapon in the law enforcement arsenal' by creating, by 2004, a database containing '3 million suspect samples – virtually the entire criminally active population' (Home Office Announcement 269/2000).

The idea of a criminal population, or a population of 'suspects', is certainly not new. Nor is the desire to create a permanent record of its existence. Yet the rhetoric of an 'active criminal population', permanently captured on the NDNAD, and comprising some three million 'suspect samples', was a spectacular proposal given the legislative framework in place for obtaining and databasing samples. In 2000 the database held

940,000 CJ samples and, even with increased funding to facilitate police to obtain and submit a greater volume of samples, a database of 3 million 'suspects' by 2004, under the existing legislative framework, would have been impossible. In fact, even with changes in the law to permit the retention of samples from those not convicted of a recordable offence, the database currently holds almost 2.5 million profiles, approximately 500,000 profiles short of the original target – although the number of individuals comprising the 'active criminal population' has been subject to substantial re-estimation and revision.

The idea of a database including the DNA profiles of the entire 'active criminal population' was based on a population including anyone who had been charged with, but not necessarily convicted of, a recordable offence. It also included, by implication, all those persons who had left biological material at crime scenes, that had provided crime scene profiles, and which remained unmatched on the NDNAD. In May 2001, following minor legislative changes introduced by The Vehicles (Crime) Act (2001), which extended the time limit from six months to three years for prosecutions to be brought for vehicle crime (to allow greater time for DNA samples to be collected and analyzed), the Government enacted the CJPA to allow for the indefinite retention of DNA samples on the NDNAD obtained from suspects not convicted or cautioned for a crime (as well as those 50,000+ samples that were currently held illegally on the NDNAD).

At the beginning of 2003 the Government announced a further 'mopping up' exercise which consisted of obtaining 13,000 samples from prisoners and mentally disordered offenders who, currently incarcerated, were not contained on the NDNAD. With this completed in late 2003 the Government had systematically expanded the database to capture what they now refer to as 'the *known* active criminal population'.

3.7 Intelligence-led screening

The growth of the NDNAD has largely been facilitated by the increased collection of CJ samples from a wide range of criminal suspects and, to a lesser extent, from unmatched crime scene stains. However, another significant aspect of DNA collection by the police involves samples provided by volunteers during intelligence-led mass screenings. As noted in the previous chapter, voluntarily sampling in police mass screening has been an important aspect of the forensic use of DNA since its implementation and remains a significant resource for criminal investigators. Up until 2001 samples provided by volunteers under these circumstances could only be used

for one-off comparisons against crime scenes stains and then, unless they produced a positive match, destroyed following the conclusion of an investigation.

The inability of the police to retain samples given with consent from volunteers attracted significant media attention after a large intelligence-led screen during the investigation of the murder of Louise Smith in 1996/7. The Smith investigation saw the largest mass screen to date, with over 4,500 samples collected and analyzed. The screen failed to produce a suspect (although a local man was subsequently convicted) but did produce a significant effect: 9000 local people, led by Smith's parents, signed a petition to request that the police be allowed to retain the samples collected during the investigation. Smith's parents argued that these samples could be potentially useful in future investigations and, therefore, should be retained.

The idea was later reflected in the Home Office publication *Proposals for Revising Legislative Measures on Fingerprints, Footprints and DNA Samples* (1999) which recommended that voluntary samples, taken where consent was given, should be retained on a 'separate database' for future use in criminal investigations. The idea of a voluntary forensic database, separate from the NDNAD, emerged as a novel way of approaching the retention of consensually provided samples. Its defining feature was that it could not be continuously speculatively searched in the same way as the NDNAD but only be used for elimination purposes. Current proposals in Scotland for the creation of such a database are under negotiation and it is imagined that volunteered samples will not be subject to speculative searching in this jurisdiction.

The idea of a separate voluntary CJ database is problematic for the police for several reasons, not least because, in prohibiting speculative searching, its intelligence capability is markedly reduced. For this reason, the legislative measures for the retention and use of voluntary samples outlined in the CJPA did not prescribe any 'special' arrangements for databasing. Voluntarily obtained samples may be included on the NDNAD and speculatively searched. Furthermore, if consent is given by a volunteer for the retention and use of a DNA sample in this way it is deemed irrevocable. We consider the ethical implications of this development in detail in Chapter Six.

3.8 Criminal Justice Act 2003

The Criminal Justice Act (2003) (CJA), the most recent Parliamentary legislation relevant to the NDNAD, has further extended the powers of the police to obtain non-

intimate CJ samples without consent from a person in police detention following arrest for a recordable offence. The Act, which grants the police powers to sample, profile and database individuals arrested but not subsequently charged or convicted in connection with a recordable offence, adds a new 'category' of person to the database: the one-time suspect who may never have been charged with a recordable offence and has no criminal record. The number of such individuals is considerable. The Home Office calculates that 300,000 individuals are arrested each year in connection with a recordable offence but not subsequently charged. This does not mean an increase of 300,000 additional profiles year-on-year to the NDNAD – since a proportion of those arrested will have been sampled and profiled at the time of a previous arrest – but the potential effect of the CJA on the size of the database is nevertheless significant.

The CJA is the first piece of legislation relating to the NDNAD which has generated substantial Parliamentary debate. In October 2003, the House of Lords rejected a Government amendment to the Criminal Justice Bill proposing the extension of police powers to retain non-intimate samples from arrestees. Peers signalled their dissatisfaction with arguments justifying its necessity. The Minister of State, Baroness Scotland, told the House of Lords that taking DNA samples at the point of arrest will 'allow more crimes to be resolved at an earlier stage' because the police can 'prevent persons who may have previously come into contact with the criminal justice system from evading justice by giving the police a false identity' (Hansard, House of Lords, 29th October 2003). She also argued that retaining these samples was justified by their potential usefulness in future investigations, not least in cases involving the arrest of juveniles:

> Many young people who may be arrested as juveniles are not charged and may never go on to commit an offence. However, it is difficult for the police to distinguish between those who may or may not commit a crime in the future. It is, therefore, a sensible precaution to retain DNA profiles as a norm (Baroness Scotland, Hansard, House of Lords, 29th October 2003).

This statement gives a clear indication of the Government's intention to capture on the NDNAD an even more broadly defined 'active criminal population', now including 'potential' offenders as well as current offenders. It is this objective of the Act, to database and retain samples for the future identification of potential offenders, rather than the taking of samples for the purpose of identity verification, which has been

most disputed. This is a distinction which the Lords recognized to be significant: 'There are two principles here: the propriety of taking fingerprints from a person who has been arrested but not charged and the decision to add that information to a database' (Hansard, House of Lords, 29th October 2003). As we argue in Chapter Six, such a decision has been extremely contentious.

3.9 Conclusion

The development of the legislative framework supporting the NDNAD in England & Wales can be characterised as a history of multiple and continuous changes to the ways in which the police can legitimately take, store and use DNA samples. These legislative provisions are the foundations on which the NDNAD has been developed and the framework through which the Government has pursued specific policy ambitions to construct an increasingly extensive forensic archive. The expansion of the NDNAD has been propelled by dedicated funding which, in line with the legislative framework, has enabled the police to collect and store samples and profiles from an increasingly diverse population. In the next chapter we focus attention on the ways in which Government has invested in, and sought to exploit, this forensic instrument in order to achieve specific policy objectives.

Chapter Four

Populating the Database: Evaluation and Expansion

> There is no clear index of value. Its assessment involves normative judgements which may vary from person to person, role to role, time to time, and case to case. How much value is to be attached to the non-conviction of an innocent suspect? How much value is to be attached to solving a particular high-profile case? How much value is to be attached to a particular clear-up rate for any volume crime? What value is to be attached to securing convictions of guilty persons in court for various offence categories? (Tilley and Ford, 1996: 40).

4.1 Introduction

Since April 2000, the 'Home Office DNA Expansion Programme' has delivered about two hundred million pounds of dedicated funding for the enlargement of the NDNAD to contain the genetic profiles of the 'active criminal population' of England & Wales. This high level of Government spending has been accompanied by demands on the police to measure and maximise the 'efficiency, effectiveness and cost-effectiveness' of their uses of the NDNAD. Such demands exemplify recurrent features of the 'New Public Management' which, since the 1980s, has increasingly been concerned to evaluate all aspects of police performance. Such evaluations have been focused systematically on scientific support to policing since the Touche Ross review of this function was presented to the Home Office in 1987.

This chapter assesses the origins and outcomes of the Expansion Programme as a Government strategy designed to harness novel technological resources and to maximise the 'forensic effectiveness' of police uses of these innovations. Since 1995, and especially since the introduction of the DNA Expansion Programme, key agencies have gradually constructed and implemented an agreed series of measurements

capable of representing the performance of all police forces in their effective and efficient deployment of DNA technology in support of crime investigation. These measures have been used to: make assertions about the absolute contribution of DNA evidence to the detection of all crime in England & Wales in each year; assess the relative contribution of DNA evidence compared to other forms of scientific evidence; measure the contribution of DNA evidence to the detection rates for different crime types; and rate the comparative performance of different police forces. In assessing the actual deployment of the NDNAD (as opposed to the sweeping rhetorical descriptions of it as a new 'weapon' in the forensic arsenal to be used in the 'fight' against crime) we draw upon the findings of a series of studies and reports which analyze its routine use by the police in crime - especially volume crime - investigations. We consider how relevant aspects of police performance are measured and the ways in which the 43 police forces in England & Wales have been encouraged both to improve their absolute and relative performance in collecting and submitting CJ and crime scene DNA samples and to utilize the resulting DNA intelligence in support of crime investigation.

4.2 Policing and the New Public Management

The commitment of a range of actors and organisations (especially ACPO, the Home Office and the FSS) to the establishment of a national DNA database and to the expansion of its use within criminal investigations was not simply an effort to supplement the existing repertoire of resources available to forensic case-work. Rather, it constituted a strategic dedication to the development of innovative uses of DNA profiling and data-basing technologies within the criminal justice system. The success of these innovations also depended on significantly raised levels of financial and legislative support by Government and on additional improvements in police investigative practice surrounding the collection of biological material and the use of the information derived from its analysis.

We have already discussed some of the important social and organisational influences on the establishment of the NDNAD in 1995. However, the consequent growth of the database and the extension of its uses would not have been possible without dedicated Government funding. This provision was shaped by, and responsive to, a commitment to the 'ethos of business management, monetary measurement and value-for-money government' (Garland 2001: 116) characteristic of the 'New Public Management' (NPM) approach to the 'modernisation' of the UK public sector. First formulated in the late 1970s as a concern with 'value for money', the application of

this approach to policing as simply one of many 'markets in services, provision and expertise' (Dean 1999: 161), meant that a wide variety of police practices were increasingly the subject of efforts to both measure and improve current levels of 'economy, efficiency and effectiveness' (see Home Office Circular 114 of 1983 on 'Manpower Effectiveness and Efficiency in the Police Service' for an early example).

The NPM approach to assessing the quality of forensic support to criminal investigation – especially the investigation of volume crime - has encouraged the development of increasingly standardised ways of measuring and comparing the individual and collective performance of all of those involved in the provision and use of this human and technical resource. These measures and comparisons require the continuous assessment of the activities of all key personnel, including crime scene examiners, custody staff, laboratory scientists, and intelligence analysts. The resulting evaluations of performance have been used to support new initiatives, to assess practical outcomes and to encourage individual forces to adopt, what ACPO, HMIC and other policy makers and observers identify as, 'good practice' in the collection and use of physical evidence within the investigative process.

An early example of such developments can be seen in the report of the accountants commissioned by the Home Office to review the organisation of scientific support in UK Police Forces in the mid 1980's (Touche Ross, 1987). The economic style of reasoning of this crucial document has provided a structuring framework which almost all subsequent studies have felt it necessary to accommodate. Produced at a time when police confidence in the quality of forensic science provision was arguably low, the report identified shortcomings in the supply of forensic analysis by external providers to the police and in the organisation of forensic science support within forces. The proposed solution to the first problem was the introduction of market mechanisms along with the principle of 'direct charging' so that individual police forces would approach suppliers (including, but not exclusively, the FSS) to agree prices for the type and volume of forensic analysis they required. It was argued that such mechanisms would allow the police, as consumers, to influence directly the quality and quantity of service they wanted in ways that were impossible when the FSS was directly controlled by the Home Office. Direct charging for forensic services to all police forces in England & Wales was introduced in 1991.

Touche Ross' proposals to solve the second problem – shortcomings in the internal organisation of scientific support within police forces – rested on two specific

recommendations. The first was an argument for the appointment of senior staff in each police force with specific responsibility for managing all forensic work undertaken within the force and for commissioning forensic work undertaken by outside agencies. Initially designated as 'scientific support managers', these new post-holders (civilians in some forces, sworn officers in others) took financial and administrative charge of all relevant specialist services including crime scene examination, force laboratories, fingerprint and photographic departments and forensic submission units.

A second set of recommendations by Touche Ross called attention to the role of crime scene examiners (then usually called 'Scenes of Crime Officers'). Research indicated wide variation amongst forces in the staffing levels of examiners and corresponding variations in the proportions of criminal investigations (especially volume crime investigations) supported by the collection and interpretation of scientific evidence. Touche Ross presented these seemingly unplanned variations as evidence of the need for Home Office direction in deciding effective staffing levels. They also argued that the Home Office should take responsibility for improving recruitment standards and training within this increasingly civilianised staff group. The Home Office responded by providing direction ('staffing levels should allow an average annual maximum of 600 cases per SOCO to allow time for satisfactory examination of scenes', Tilley & Ford 1996) and training standards were markedly improved, especially through the work of the National Training Centre for Scientific Support to Crime Investigation.

4.3 Measuring investigative effectiveness

The general introduction of the new discourse of economy, effectiveness and efficiency into all aspects of policing in England & Wales, and the developing techniques of measurement and control that it inaugurated, occurred at a time when increasing levels of public spending on the police were met by rising crime rates and an apparent decline in police performance. Whilst expenditure on policing rose by almost 50% between 1981 and 1992, recorded crime had risen by 70% over the same period, and clear-up rates had substantially fallen from 41% in 1979 to 27% in 1992 (Audit Commission 1993). In 'Helping With Enquiries', the Audit Commission (1993) argued that insufficient attention had been given to measuring the effectiveness and efficiency of the work of the criminal investigation departments of police forces.

Despite widespread assertions that the collection and collation of criminal intelligence were essential features of an effective approach to the detection of crime, the Commission described the units that routinely undertook this work in many forces as 'the refuge of the lame, sick and elderly' (para 78). The report argued strongly for the replacement of what it characterized as poorly organised and largely reactive work within criminal investigation departments with a 'proactive intelligence-led crime management' approach. This is an approach in which active offenders are identified and their activities targeted through a coordinated response informed by intelligence gathered and analysed by intelligence units operating within Police Forces. The report's critical commentary on the absence of evaluations of the effectiveness of criminal investigations in general provided both impetus and opportunity for the three main stakeholders in forensic science (the Home Office, the FSS and ACPO) to jointly develop a variety of further assessments of the actual and - perhaps more importantly - potential contribution of forensic science to successful crime investigation.

4.4 Using physical evidence

The first of these studies, subtitled 'An Examination of Police Decision Making' was carried out by the Police Foundation and was a joint project commissioned by the FSS and ACPO following discussions in Autumn 1991 between the Forensic Science Service and the Crime Committee of the Association of Chief Police Officers (Saulsbury, Hibberd and Irving, 1994: 1). The study focused on police views of the 'usefulness' of different kinds of commonly encountered forensic evidence, on how decisions were made about the submission of such evidence for analysis, and on the degree of police satisfaction with the quality of case-relevant information provided to them by FSS scientists.

Despite some significant methodological limitations the research clearly indicated the emerging importance attributed to DNA profiling by serving police officers and police forensic specialists in the early 1990s. In fact, unspecified 'DNA Analysis' was the only form of forensic evidence that was rated conclusive by a majority (90%) of respondents. Furthermore, the report is also important because it raised a number of key themes which continued to resonate with subsequent research in this area, in particular: the lack of recognition given to the specialist knowledge and skills of crime scene examiners; low levels of satisfaction with the turnaround times for services provided by forensic laboratories and with the quality of information provided by those laboratories; and concerns about the rising costs incurred by the rapidly expanding commitment to the forensic support function in most individual forces.

4.5 A programme of research?

In January 1994, a joint ACPO/FSS seminar was held at Bramshill Police Training College to discuss police uses of forensic science in support of criminal investigations and, specifically, the relationship between police forces and the FSS. Following the seminar, a Steering Group jointly chaired by the ACPO Lead on Forensic Science (D.G.Gunn of Cambridgeshire Police) and the Chief Executive of the FSS (Janet Thompson) commissioned and jointly resourced three projects: 'an environmental audit of forensic science provision'; a 'review of charging systems'; and 'guidelines for good practice in the use of forensic science'. Described by Thompson as part of 'an extensive programme of work aimed at improving the awareness, usefulness, scope and value of scientific support in the policing process' (Saulsbury, Hibberd and Irving 1994: v), the resulting research provided an important assessment of the place of forensic science in criminal investigations in the mid-1990s.

The most important project within this programme was carried out between July 1994 and September 1995. One report of this work was published as a 'diagnostic paper' in the Home Office 'Crime Detection and Prevention Series' (Tilley & Ford 1996), and another in the Home Office 'Police Research Series' (McCulloch 1996). In addition, a set of good practice guidelines developed by the project team - 'Using Forensic Science Effectively' - was also produced and circulated to Scientific Support Units in all forces in England & Wales. Whilst neither of these papers mention the role of the Audit Commission, it is interesting that the authority of the Commission was used in support of the guideline document which credits all three agencies as its joint source (ACPO/FSS/Audit Commission 1996).

The study by Tilley & Ford (1996) was initially piloted in two forces, and fieldwork for the full research was carried out in twelve forces between July 1994 and June 1995. The report of the study offered a rather discouraging account of the organisation and use of forensic science support to crime investigation, especially the investigation of volume crime, some years after the implementation of the Touche Ross reforms in the late 1980s and early 1990s.

Tilley & Ford asserted that the uses of forensic science remained essentially reactive, focusing on individual cases, rather than being integrated into wider policing as a routine element of crime investigation. More worryingly, they reported a 'widespread lack of awareness within the police service about forensic science itself and what various tests can do' (1996:v). Furthermore, whilst they could generate no data of

their own to make possible measurements of the cost-effectiveness or 'investigative cost-benefit potential' of existing patterns of use of forensic science, they dismissed the methods used by some forces at the time to determine effectiveness as having 'dubious reliability or validity' (Tilley & Ford 1996: 46-7).

A second study ('initiated to assist' the related work of Tilley & Ford) again situated its work by reference to the earlier report by Touche Ross, but focused very directly on the recommendations in that report for the collection by individual forces of annual statistics 'on scene examination, fingerprints, forensic science and photography' (McCulloch 1996: 1). It also examined the analysis and reporting of these differences between forces by an unspecified 'central body'.

Even though McCulloch's work was largely based on the analysis of routine data captured by each force using a common computer package, she reported severe technical difficulties in assembling a robust comparable set of data from the forces in her sample. Despite these shortcomings, however, the available data (for the calendar year 1994) do permit the identification of some interesting patterns of forensic evidence collection and analysis in a range of crime investigations across the twelve forces studied. Data on DNA submissions are found in various places and in a variety of formats throughout McCulloch's report. In one table (Table six) they are shown to comprise only 5% of all forensic submissions at that time, with documents, glass, fibres and footwear all being more numerically significant than this form of biological evidence (although the table is confusing since alongside 'DNA' it also separately lists 'semen', 'body tissue', and 'saliva' as being submitted for examination). Another table (Table seven) which displays the proportion of DNA tests accounted for by four main offence categories shows that 40% of DNA submissions were made as part of the investigation of sexual offences, 32% were made in connection to the investigation of murder and suspicious death, and 20% were made in support of assault investigations. The investigation of burglary in 1994 occasioned only 2% of DNA submissions in the twelve forces studied. Most forces used DNA testing in about 1% of cases overall; two forces did not use DNA testing for burglary scenes whilst the force with the greatest volume of submissions made 9% of these in relation to burglary investigations.

An important aim of McCulloch's study was to examine available data on police evaluations of the usefulness of different forensic items collected from the crime scene. The guidelines followed by each force for data entry to the relevant computer

system expected both Officers in the Case (OICs) and Scientific Support Unit (SSU) personnel (usually Scientific Support Managers) to evaluate the usefulness of each forensic submission made. Whilst the report provides some information about the views of SSU staff on the usefulness of DNA tests at this time, the data are difficult to interpret with 36% of the DNA tests being evaluated by SSM's as providing 'Conclusive evidence which identifies or eliminates a suspect' and a further 30% providing 'No evidential value'. The reasons for these findings are unclear. They could result from the failure of some tests to produce a profile or from the fact that some may have produced full profiles which were of no immediate use in the absence of a suspect to whom genotypical comparison could be made. Alternatively the results may reflect the uncertainty of investigators at the time about the kinds of inferences that legitimately could be drawn from the availability of DNA matches in specific circumstances.

The two studies, by Tilley & Ford and McCulloch, provided the most detailed and systematic examinations of the uses made of forensic information and expertise within the police service in the early 1990s. Yet the poor quality of police data available to their research imposed severe limitations on the conclusions they could offer concerning the effective uses of particular forensic technologies in general and DNA profiling in particular. Because of the timing of the work, neither the research report nor the good practice guidelines it contained provided detailed discussion of the emerging uses of the NDNAD (the fieldwork was largely carried out before the establishment of the NDNAD in 1995 and some years before state support for routine DNA analysis and databasing). Perhaps for this reason, Tilley and Ford's comments are understandably cautious:

> There were initial fears amongst a number of SSMs and forensic scientists that the development of the DNA database might siphon funds from budgets allocated by forces for other forensic analysis. Early indications are that forces appear generally if not universally to have set aside a separate sum for DNA database work, although estimating needs is problematic since there are widely varying estimates of the proportion of scenes which will yield stains susceptible to DNA profiling. Any longer term effect of the DNA database will presumably depend in part on its outcome effectiveness which has obviously yet to be evaluated (Tilley and Ford 1996: 42).

The multi-agency project, of which the research was only one element, used the essentially negative findings of the two studies to reinforce arguments about the necessity for wholesale improvements in current standards in the collection and utilisation of scientific information for intelligence and evidential purposes. These improvements were heavily promoted in *Using Forensic Science Effectively* (ACPO/FSS/Audit Commission, 1996), a document that was widely disseminated amongst forces and which was heavily endorsed by senior staff in the FSS and ACPO.

Insofar as it identified and commended examples of 'best practice' *Using Forensic Science Effectively* also served as a promissory note to Government, suggesting what could be achieved by those police forces who were fully competent in the deployment of a quickly expanding repertoire of forensic technologies. Interestingly, in the good practice guidelines, the critical stance of the Tilley and Ford report on the chronic shortcomings of 'performance indicators' as primary research data was used to support a demand for the 'urgent' development and use of performance indicators capable of measuring not only the 'internal efficiency' of scientific support units but also the 'success of scientific support units in supporting the investigative process' (ACPO/FSS/Audit Commission, 1996: 40). In relation to the latter, the document suggested that any assessment of 'success' should be based 'not just on how much fingerprint and other forensic evidence was collected, but how much intelligence was supplied, evidence provided, and how many crimes were cleared as a result' (page 13). Subsequent commentaries by HMIC, the Home Office and others on the use of forensic science by the police have all emphasised the content of the 'guidelines' document rather than the diagnostic papers when seeking to extend the influence of, what Thompson described as, a 'truly collaborative effort' and Gunn described as an exemplification of 'FSS/Police partnership in action'.

4.6 Establishing forensic uses of the NDNAD

The absence of a strong evidence base for the assessment of the value of DNA profiling to a wide range of criminal investigations before 1995 is hardly surprising. Whilst parallels were drawn to the longstanding use of fingerprint databases, research showed that the number of volume crime scenes from which DNA was collected was very small in comparison to the number of such scenes at which fingermarks were found. Given this situation, the potential contribution of a DNA database of offenders to improving the detection of volume crime was necessarily a matter of future expectation rather than of proven effectiveness.

Initial financial support for the establishment of the database and the development of DNA profiling was given to the FSS, but no equivalent funding was provided to police forces (apart from a sum of £3 million spent on 'raising awareness' of the value of DNA profiling and databasing across the police service). Instead, individual forces were charged for each sample profiled and each profile and sample stored by the FSS. Because of this funding regime (and concerns about rising expenditure on forensic science), during the early years of the NDNAD, most forces limited the sampling of suspects to those arrested for sexual and violent offences and some burglaries (especially of domestic dwellings). This meant that, while the database grew, its rate of growth was slow and, as a consequence, the matches derived from it were correspondingly fewer than had been hoped. Furthermore, delays in the expansion of FSS processing facilities meant that increased submissions occasioned substantial backlogs in profiles being loaded onto the database.

These problems, in part the consequence of Government demands for the speedy implementation of the database, were reflected in what have been described by others as the 'critical findings' of two studies commissioned by the Home Office and completed a year after the establishment of the NDNAD (Burrows, 1996 and Steventon 1996). Since neither has been published their details remain unavailable, but a later report refers to the existence of operational difficulties with the early implementation of the database. However, despite the absence of a strong evidence base endorsing its effective uses across the 43 forces of England & Wales, the early days of the NDNAD were marked by a series of statements by the FSS, by ACPO, HMIC and the Home Office which re-emphasised the general promise of DNA profiling and databasing as a new resource with huge potential for increasing the effectiveness of criminal investigations.

Between 1995 and 1998 a series of important developments in laboratory technology made possible improvements in the analysis of crime scene DNA which in turn contributed to an increase in the quantity and quality of forensic intelligence available to police forces. However, in addition to several joint FSS/ACPO pilot projects which disseminated knowledge of these improvements, the FSS also used available data on the collection and use of several types of forensic intelligence (especially, but not exclusively, fingermarks and DNA profiles) to construct a general 'crime reduction model'. This represented an idealised version of the potential contribution of increasingly routine crime scene DNA profiling and the NDNAD to crime detection and reduction. Described by their Director of Service Delivery as 'crude but powerful', one

year's data on the examination of 'property crime' (including car crime, dwelling house burglaries and burglaries of non-dwellings) were used to construct an attrition model of the investigative process which identified the main stages in the filtering which occurs between an offence being recorded by the police and the bringing to justice of an offender. In this model only some of these stages were given numerical values, in particular: the proportion of scenes of crime at which biological material suitable for DNA profiling may be found; the proportion of these samples from which DNA profiles may be constructed and matches made; the proportion of these matches that may contribute to the detection of the crime in question; the number of admissions of further offences that may be made by those charged with the crime; and, by inference, an estimation of the further deterrent effect on those offenders.

Whilst the model did not estimate the proportion of scenes of recorded crime which could be forensically examined, it suggested that DNA material was potentially discoverable from 5% of those examined and that there would be a 30% match rate when profiles derived from these examinations were loaded onto the NDNAD. Furthermore the model did not provide a separate figure for the 'conversion' of these DNA profile matches into detections but instead estimated a 'conversion rate' of 60% for the four main types of forensic identification evidence (DNA, fingerprints, shoemarks and toolmarks). It also suggested that each detection would secure the admission of a further two offences by the offender. Despite the acknowledgement by the FSS of problems in the detailed figures, and the contestability of certain inferences drawn from them, the model was sufficiently plausible to support an argument to the Government of the value of increasing the numbers of genetic profiles held on the NDNAD 'to a size similar to the fingerprint database'.

These various claims and promises persuaded Ministers of the potential benefits of expanding the NDNAD, but there remained the difficult issue of how long it would take before its potential usefulness could be maximised. Furthermore it was also expected that the capacity of the police and the FSS to accomplish the levels of detection (and eventually reduction) predicated by the model rested on improving the 'front and back ends of the supply chain' – in other words on improving police operational performance in the collection of more CJ and crime scene samples at the beginning of the chain and in the effective use of intelligence derived from the analysis of resulting DNA matches and mismatches at the end of the chain.

It is reported that the response of Home Secretary Jack Straw, to the suggestion that it would take 14 years for the NDNAD to reach the size of the fingerprint database on current growth forecasts, was to insist on a plan for this growth to be accomplished within a much shorter period, of four to five years at the most. The provision and acceptance of this plan in the form of a particular government funded 'programme' marked a dramatic improvement in the potential for the growth of the NDNAD and a corresponding rise in its usefulness for the investigation of crime. The 'DNA Expansion Programme', established in 1999 and originally designed to run until 2004, provided dedicated funding to individual Police Forces for 'the taking and processing and loading of CJ and SOC [scenes of crime] samples to the Database, the employment by the police of the necessary associated support personnel and equipment and the establishment of the DNA Liaison Panel meetings' (NDNAD Annual Report, 2003).

4.7 Rolling out the Expansion Programme

The first stage of the Expansion Programme used a 'matching' method of funding that consisted of two elements. First, the Home Office allocated the £17 million of the 2000/2001 programme budget to each police force (in proportion to their size); second, each force was required to match this figure from their own budget and also to spend all of these earmarked funds on the accumulation and processing of CJ samples and crime scene submissions. The bulk of this expenditure by forces thus became income for the FSS and other forensic suppliers and facilitated further investment in laboratory facilities and staffing provision. On August 31st 2000, just six months into the first year of the programme, Prime Minister Tony Blair announced the addition of £109 million (£25 million in 2001/2002; £42 million in 2002/2003; £42 million in 2003/2004) to the £34 million already committed for the first two years. It seems that these funds were not allocated for any fixed use, but a condition of the grant was that forces had to continue to spend £17 million nationally on DNA sampling for the years 2000/2001, 2001/2002 and 2002/2003. ACPO enquiries amongst forces suggested that increases in the number of CJ and crime scene samples submitted for profiling and databasing necessitated additional expenditure on personnel to collect and process these samples, along with the resulting matches returned to forces by the NDNAD, and it was suggested that the additional grant money be spent on these staffing requirements. In view of this, the Home Office developed a distribution mechanism which required forces to bid for additional funds for these purposes from the global figure of £109 million.

However, funding became even more complex when, three weeks after the Prime Minister's announcement on 24th September 2000, the Home Secretary announced an additional £59 million funding under the programme 'specifically for enhancing forces' ability to attend crime scenes' for the collection of DNA evidence. This 'enhancement' meant the employment of 'assistant crime scene examiners' to be used largely for the examination of a limited range of volume (especially vehicle) crime. This was a clear endorsement by government of a recommendation by Blakey in 'Under the Microscope' (HMIC 2000) which recognised the success of Northamptonshire Police who were the first force to have introduced this cadre of staff some years earlier.

In official publications after September 2000 the two streams of funding were added together and the sum of £168 million usually referred to thereafter as 'Phase 2 of the Expansion Programme'. Forces began to make bids for funding from this programme from November 2000 onwards. We have already indicated that the DNA Expansion Programme was intended to have a dual focus on the 'front end' (offender sampling and crime scene stain collection) and 'back end' (using DNA matches to improve detections) of the forensic DNA process. Certainly for the first years of the programme, greater emphasis was given to 'front end' issues with the aim of databasing the profiles of 'all known offenders' or 'the whole of the active criminal population' and identifying and collecting DNA from 'all viable crime scenes'. The main target set at the beginning of the Expansion Programme was the databasing of all 'active offenders' by March 2004. The initial numerical estimate for the identity category 'active offender' was given as 3 million, but it was acknowledged by the ACPO lead on forensic science in October 2000 that the numerical target was to be reviewed throughout the lifetime of the programme (with the 'true target' for CJ sample profiles being to ensure the DNA sampling of anyone convicted of committing a recordable offence who does not already have a profile on the NDNAD). This target has subsequently changed to reflect the extension of police powers to take samples from all of those arrested on suspicion of involvement in a recordable offence.

Arrangements for the evaluation of the Expansion Programme were in place from its beginning with the formation of an 'Evaluation Group' chaired by the ACPO lead on forensic science. This group studied used the performance data returns made by all forces for each quarter of the first year of the Expansion Programme and also undertook a study of the 'systems and processes' for the collection and use of DNA samples and profiles in a sample of five forces. The unpublished report of the DNA

Expansion Programme Evaluation Group showed that there were many areas of difficulty and uncertainty in the first year of the operation of this large and ambitious national programme. The report separately discussed the performance of forces in three 'key stages' of the process of DNA collection and use: crime scene attendance, 'offender sampling', and 'actions following notification of a match'. Much of the report was concerned with the shortcomings in the data returns provided by forces, but it also identified a series of general organisational issues impacting on the success of the programme. These included: the absence of clear guidelines on how the new money provided to forces should be best spent; overly ambitious expectations of the level of improvements in detections that could be delivered from DNA profiling of crime scene samples; and poor levels of integration of scenes of crime staff with other investigators.

Similar, if not more forthright, criticism of the responsiveness of some forces to the opportunities presented by the Expansion Programme were made by David Blakey in his important thematic inspection of scientific and technical support for policing (HMIC 2000). For the Chief Inspector of Constabulary, the funds granted under the programme 'illustrate a significant measure of faith that the police service can deliver what is expected of it' (HMIC 2000: vi). He also asserted that it was 'vital' that the police service responded to this 'substantial commitment' by showing 'its full commitment to the recovery of DNA material wherever possible in order to detect crime and reduce offending'. However it is clear throughout the report that Blakey was not confident that the aims of the Expansion Programme were being achieved and he drew particular attention to three issues: the failure of many forces to expand the category of offences in connection with which DNA samples were taken from individuals (not all had expanded their collection from the original focus on domestic burglaries, violence and sexual offences); the failure of many forces to remove profiles from the database of those charged with offences against whom action was discontinued or who had been acquitted at court (he estimated there to have been 50,000 such profiles held on the NDNAD at the time of his inspection); and the large variations between forces in the rate at which their crime scene examiners were submitting DNA samples from scenes attended (e.g. in burglary investigations, the rate varied from a high of 7% to a low of 1%).

The importance of Blakey's assertions of the urgent necessity for improvements in the ability of forces to collect DNA samples and monitor their uses of DNA profiles was recognised in the decision to undertake a further HMIC inspection within 18 months

of his report. This 'revisit' inspection was explicitly undertaken to assess the response of the police service to the recommendations contained in 'Under the Microscope'. Whilst many of the forces studied had improved some aspects of their performance, Blakey's comments were less than enthusiastic: 'Things are improving but sometimes too slowly despite the large amounts of money invested' (HMIC 2002: vi).

In fact, improvements in the performance of the police service in the collection of both CJ and crime scene samples were already well underway before the publication of the second inspection report. The following table (taken from the first NDNAD Annual Report 2002-2003) shows the growth in the number of CJ sample profiles since the establishment of the database.

Table 2

Number of CJ sample DNA Profiles loaded onto the NDNAD

Year	1995/6	1996/7	1997/8	1998/9	1999/2000	2000/01	2001/2	2002/3
CJ Profiles Loaded	39712	85961	137161	269718	228088	466555	586026	488519

The effect of the first year of the Expansion Programme is particularly visible in that the number of CJ sample DNA profiles loaded on to the database in 2000/2001 was more than double that of the previous year (roughly equivalent numbers were loaded in each of the following two years). Whilst it became clear that individual forces continued to differ in the rates at which they increased the proportions of offenders from which DNA samples were taken, by the end of March 2003, the NDNAD held 2,099,964 CJ sample DNA profiles.

The yearly growth in the number of crime scene sample DNA profiles loaded onto the NDNAD has also been very substantial, and once again, as Table 3 shows, the first year of the Expansion Programme witnessed a significant increase in this figure.

Table 3

Number of Crime Scene sample DNA Profiles loaded onto the NDNAD

Year	1995/6	1996/7	1997/8	1998/9	1999/2000	2000/2001	2001/2002	2002/2003
SOC Profiles Loaded	2681	7517	18691	19233	224896	33459	53235	65649

Each year's newly loaded CJ profiles simply add to the accumulating total of such profiles held on the database, whereas as soon as crime scene sample DNA profiles are matched with CJ sample DNA profiles, they should (on the request of the submitting force) be removed from the database. Whilst this may be done less rigorously and less quickly than is preferred, it is done in sufficient numbers to mean that the total of crime scene sample profiles on the NDNAD (193,135 at the end of March 2003) should include only the unmatched records of the genetic profiles of currently unidentified individuals.

What had also exercised HMIC and other commentators, however, was not simply the growth of the database as such but the extent to which individual forces were collecting and submitting all relevant biological samples from scenes of crime as well as differences in their effectiveness at converting DNA profile matches into detections. While there was strong encouragement and financial provision for the collection of increasing numbers of crime scene samples, no equivalent 'true target' was set within the programme for the number or proportion of crime scenes from which forces were expected to be able to obtain such samples, let alone the rate at which matches should be converted into detections. In addition the quality of the data provided by forces on these matters continued to give substantial cause for concern amongst the Inspectorate and other stakeholders.

Despite these shortcomings, HMIC had recognised that several important initiatives had been introduced within particular forces during the first five years of the NDNAD. Some of these became especially significant in establishing expectations of what could generally be achieved with the additional resources provided by the Expansion Programme, the most important of which was a joint ACPO/FSS intervention into the use of forensic science in two forces in the North-West of England. The 'Pathfinder

Project' was expensive (the final cost was £1,157,079), although most of the resources were used to fund and support the work of project managers and a team of forensic examiners supplied by the FSS. It was agreed in advance of the announcement of the DNA Expansion Programme and was funded directly from the Home Office Crime Reduction Programme.

The main aim of Pathfinder was to 'assess the effectiveness of applying enhanced forensic techniques' (especially 'Low Copy Number' DNA, footwear marks and tool marks) to the examination of property (burglary and car) crime scenes. However this original aim was augmented by an assessment of the impact of the first phase of the DNA Expansion Programme in the two forces. The findings of the study are too complex to report in detail here, but its most significant contribution to understanding police uses of DNA profiling and databasing was its claim to provide a new model for maximising the impact of forensic science on crime detection. Whilst the earlier FSS model had suggested that 'forensic activity' (largely the collection of physical evidence at crime scenes, the analysis of that material and its use by investigators) leads to the detection of 0.9% of recorded crime, the model provided by the Pathfinder team suggested that approximately 3.3% of recorded burglary and auto crime offences could be detected through the effective collection and use of fingerprints and DNA, and that this figure could reach 3.9% if these technologies were enhanced by the use of more sensitive (but expensive) DNA technologies as well as increases in footwear mark, and tool mark collection.

The attrition figures for the collection and use of DNA in different stages of the investigative process provided by this new model were more optimistic than those included in the earlier FSS model. Using performance data collected in the course of the project it asserted that 6% of property crime scenes attended should yield relevant biological material and that profiles should be obtained from 60% of this material using conventional technologies. Furthermore, 73% of such crime scene profiles when loaded onto the NDNAD should match individual profiles already held on the database (in other places in the model NDNAD scene-to-person matches are expressed as a proportion of DNA material recovered from crime scenes, thus providing a 'match rate' of 44%). The figure provided by this model for the conversion of DNA matches to detections (depending on the assumptions made, this figure is given as either 73% or 80%) is also significantly higher than that of the earlier FSS model (of about 60%).

4.8 Refocusing the Expansion Programme

As concern grew amongst forces that Expansion Programme funding would not continue after 2004, the Programme Management Board (and others) have continued to emphasize the necessity for the police service to focus more sharply on the 'back end' of the investigation process in order to improve both knowledge and force performance levels of the contribution of DNA derived intelligence to crime detection (and crime reduction). It is widely acknowledged that forces differ in their ability to provide accurate data on the latter stages of the attrition process, but it is also asserted that there is significant variation between forces both in the proportion of DNA matches achieved and in their effectiveness at converting these matches into detections.

Currently available national figures show an expected increase in both the number of DNA 'CJ to crime scene' matches and the number of detected crimes in which a DNA match was available during the first three years of the programme. They are shown in Table 4 below.

Table 4

DNA Matches and Detections

Year	DNA matches	DNA detections	Proportion of Matches resulting in Detections
1999/2000	23,021	8,621	37%
2000/2001	30,894	14,785	48%
2001/2002	39,084	15,894	40%
2002/2003	49,913	21,082	42%

The figures show large increases in both matches and detections between 1999/2000 and 2002/2003 (an overall 117% increase in the number of offender to scene matches, and 145% in the number of detections where a DNA match was available). However, whilst the number of *matches* can be seen to have increased at a relatively steady rate, the number of DNA *detections* can be seen to have increased at a very unstable rate. It is also clear that the proportion of *matches resulting in detections* has not increased markedly. However the statistics on detections have to be interpreted with particular care, not only because of known differences in the ways in which forces record and return these data, but also because of the variable role

played by any DNA matches in the detection process. It should also be noted that, in each of the years included in the table, the proportion of DNA detections is much lower than the proportions provided in both the FSS and pathfinder models. This is because both of these models were based on the investigation of property crimes in which the proportion of such detections is known to be higher than in other crime types.

There continue to be wide variations between the 43 police forces of England & Wales in match and detection performance. However, there are serious difficulties in interpreting these differences since it remains unclear how much of these variations reflect differences in reporting practices and how much reflect underlying differences in investigative performance. The recent introduction of PSU 'Performance Monitors' which 'track the effectiveness of the forensic process' now provide individual forces with detailed information on their collection and use of DNA in support of the investigation of volume crime. These are not disseminated outside of the forces concerned but they do show that many forces are now able to produce results for the collection and use of DNA at burglary scenes that are not dissimilar to those anticipated in the Pathfinder model. Nevertheless the absence of publicly available data make it impossible for the details of these performance differences to be examined or assessed by anyone outside of the confines of the police service and the Home Office.

4.9 Conclusion

Political enthusiasm for the establishment of the NDNAD was occasioned by the orchestrated claims of two of the key agencies involved – the FSS and ACPO. Whilst its early days were inevitably characterised by sound but modest achievements the introduction of the DNA Expansion Programme marked not only a dramatic renewal of Government commitment. It also provided a major stimulus to existing efforts by the Home Office and ACPO to find ways of measuring and optimising the performance of forces in their use of forensic science in general and DNA profiling in particular.

All Police Forces in England & Wales are subject to a common formal regime of accounting, with additional elements of central control reinstated through the establishment of 'norms, standards, benchmarks, performance indicators, quality controls and best practice standards, to monitor, measure and render calculable the performance of these various agencies' (Dean, 1999: 165). In particular, the auditing

of local variations in policing practice and performance has been oriented to inter-force comparisons and intensive efforts have been made to establish methodologies to accomplish these comparisons which allow for differences in the demographic and geographic contexts within which different forces operate.

There has been a history of model building, of the establishment of 'good practice', and the encouragement of common data capture and operational systems, all aimed at improving the use of DNA and other forms of physical evidence amongst the 43 Police Forces of England & Wales. Despite this, the continued existence of variations between forces in their collection and use of DNA samples and profiles exemplifies (and also makes apparent the ambiguities within) the current versions of 'government at a distance' (Miller and Rose, 1990; Rose and Miller, 1992) in which there is a permanent limit to the extent to which individual Police Forces can be required to comply with central directives. Whilst this makes all generalisations about 'police uses of DNA' subject to qualification, it also allows innovation and experimentation across the range of forces so that what can be seen to work well in one place may later be replicated elsewhere.

There have been times in the last four years when the difference between ministerial expectations and the achievement of detections directly attributable to DNA intelligence prejudiced the funding of the Expansion Programme. It is difficult to know whether this difference should be attributed to the over-optimistic forecasts of the potential effectiveness contained in the models of forensic investigation provided, first by the FSS, and subsequently by the Pathfinder research team, or to variations in the capacity of individual police forces to engage fully with the promise of the programme. At the present time it is generally acknowledged that there is an absence of reliable and objective research data with which to test these alternative hypotheses. It is less generally realised that there is a continued reluctance on the part of key agencies to make existing data available for independent analysis.

Chapter Five

Governing the NDNAD

> Granting that high standards are a sine qua non for the responsible use of DNA tests does not, of course, amount to saying that technical standards are the only issue of concern in relation to this infant technology. Indeed, in a speech to a symposium at Harvard University in the fall of 2000, Reno herself struck a deeper, more humanistic note, saying that the challenge is to learn how to govern, rather than be governed by, the power of DNA. If the problem is the broad one of governance, not simply the narrower one of standard-setting, what role should experts expect to play in that process?….We need expert bodies like the [National] Commission [On the Future of DNA Evidence] to help us understand and mediate our relations with DNA-based techniques. In turn, the experts must learn to see their role as integral to democratic governance in what scientists have termed the age of genetics, and to conduct their affairs accordingly (Jasanoff, 2001a).

5.1 Introduction

In Chapter Three we described the ways in which a series of legislative provisions have created the framework within which the police may legitimately employ DNA sampling and comparison in support of crime investigation. However, since the NDNAD rests on no single statutory instrument, it is necessary to look elsewhere in order to understand the arrangements which oversee its operation. Of particular importance are the current arrangements for the custodianship of the NDNAD (which denote responsibility for the routine storage of genetic profiles, the comparison of profiles with one another, and the release of information about matches) and the governance of its use (how the accumulation, storage and use of genetic samples and profiles is managed and monitored).

This chapter explores the relationships that have developed between several public and private sector agencies involved in the custodianship and governance of the NDNAD. Of particular importance to this network is the *Memorandum of Understanding* that currently provides a regulatory framework with the aim of establishing and monitoring standards in forensic DNA analysis, controlling the uses

that can be made of information derived from biological samples, and devolving significant operational responsibilities to the database Custodian. We also assess recent critical commentaries made in relation to the existing custodianship and governance arrangements of the NDNAD and discuss possible changes to these arrangements in the light of the recent government review of the FSS.

5.2 Contemporary 'principles' of governance

The organisation and regulation of the NDNAD instantiates general patterns of governance prevalent in a range of contemporary social enterprises in general and public sector organisations in particular. England & Wales has no single model for the organisation of public sector services where there exists 'a diversity of organisations providing and delivering public services with constitutions, funding arrangements and operational procedures appropriate to the work they do' (Cm. 3557 1997: 7). This diversity reflects the character of the contemporary public sector as a network of public and private bodies operating within market or quasi-market social environments rather than as elements in a complex but unitary state bureaucracy. However, despite important differences between the various bodies within this network, a degree of uniformity in the ways that they are governed has been attempted through the application of a common discursive framework of 'public accountability' (see for example Cm. 3557, Cm. 3179 and Cm. 2850).

Three particular elements of public accountability are especially significant for the ways in which arrangements for the custodianship and governance of the NDNAD have been established, developed and, subsequently, criticised: first, 'juridico-scientific accountability' as the requirement that organisational structures and operational procedures have sufficient integrity to satisfy legal requirements and resist adversarial – including scientific – challenge; second, 'administrative accountability' which requires that economy, efficiency and effectiveness can be authoritatively established and assessed through various forms of audit appraisals; and third, 'civic accountability' which expects structures and processes to be open, transparent and responsive to the wider civil society within which they operate.

5.3 Governing the NDNAD: the 'Memorandum of Understanding'

A small network of institutional actors is directly involved in the operational uses of the NDNAD: the FSS (the major supplier of profiles and the database 'custodian'); ACPO (each of the 43 Chief Constables in England & Wales 'owns' the genetic samples, obtained from crime scenes and from individuals, and the information

derived from them); the Home Office (the Government Department providing policy steerage and dedicated financial support for the growing use of forensic science in support of crime investigation); and a small number of private sector laboratories (authorised to analyse samples provided by Police Forces and submit the resulting profiles for loading onto the NDNAD).

These central roles of 'supplier', 'custodian', 'owner', and 'user', along with the rights and obligations that each implies, were initially established in a *Memorandum of Understanding* (MOU) drawn up between two of the major agencies within this network – ACPO and the FSS – when the database was first established in 1995. Whilst the origins of the MOU are obscure, and the framework has undergone small changes of detail over the years of its existence, it remains the primary instrument of NDNAD governance. The detailed organisational structures and operational responsibilities specified in the MOU are described as being determined by the application of a small set of underlying 'principles'. The most important of these are: the distinction between FSS ownership of the 'database' and individual Police Force ownership of both biological material (samples submitted for DNA analysis) and the profile data derived from them; the requirement for 'integrity in the management of the NDNAD in order to maintain public confidence in the use of DNA profiling'; and the characterisation of appropriate uses and users of the data (data are provided 'exclusively for the purposes of law enforcement', are 'available to authorised police users only for that purpose', can be used to provide 'intelligence and information to police forces', and 'will not provide evidence for use in court') (Forensic Science Service, 2000).

Whilst the FSS, as a corporate body, is often described as 'Custodian' of the NDNAD, elsewhere in the MOU, 'Custodianship' is also represented as a set of powers and duties embedded in a particular office occupied by a single individual – currently the Chief Scientist of the FSS. This key officeholder is in turn accountable to the body which is given overall authority for the management of the database by the MOU: the NDNAD Board (largely comprising FSS and ACPO representatives). This Board is responsible for 'maintaining the integrity of the data held and the efficient and effective provision of NDNAD information and services' (Forensic Science Service 2000: 6) as well as monitoring the performance of the NDNAD using 'data and information on usage, input and outputs' provided by the Custodian (Forensic Science Service 2000: 11). The Board itself has to 'direct the development of agreed data and criteria on which to assess current national performance and to evaluate development

proposals' and is also expected to 'direct and sponsor management research and development with a view to identifying and promulgating good practice in the management of DNA by forces'. (Forensic Science Service, 2000: 11).

In the following sections of this chapter we will examine the ways in which the MOU, along with several other supporting documentary sources, provide the framework in which the various participants involved with the operation of the NDNAD recognise and respond to the three kinds of organisational accountability that were described above, namely: juridico-scientific accountability, administrative accountability, and civic accountability.

5.4 Juridico-scientific accountability

Insofar as the law allows the NDNAD to be used to store and speculatively search DNA profiles taken from individuals and from crime scenes, the MOU recognises a responsibility on the part of the Custodian to establish and maintain 'appropriate protocols procedures and standards of performance required to ensure the reliability, compatibility and legality' (Forensic Science Service, 2000) of all the data held on the database. Juridico-scientific accountability is universally recognised to be central to the establishment and uses of the NDNAD. Effective control over the management and uses of the Database is seen by ACPO as largely subject to a legal framework which both enables and constrains how these data are managed as well as the uses to which they may legitimately be put. From such a perspective, both the system of database governance and the scope of allowable uses of DNA for operational purposes are the product of the legislative arm of government to which the Police are ultimately responsible. A series of statutory instruments and government circulars is seen to provide the essential limits of legitimate action (for example, Home Office Circular 25/2001, updating HOC16/95). A wide range of organisational issues is involved in the exercise of these responsibilities, the most important of which are described below.

5.4.1 Standard setting

There are a number of ways in which the Custodian exercises a responsibility for setting standards for the operation of the database to 'ensure the reliability, compatibility and legality' (Forensic Science Service, 2000) of all data held on it. First, the Custodian advises the Board on the DNA data that are to be used for the construction of profiles to be held on the database along with the minimum standards that have to be met for each separate profile to be loaded and searched. Second, the

Custodian has the duty to establish 'appropriate protocols, procedures and standards of performance' (Forensic Science Service, 2000) for database entries, information derived from them, and of the reports provided to relevant users. Third, the Custodian sets standards for the specification of all collection kits that may be used by forces to take samples from individual suspects or volunteers and from scenes of crime. Finally, the Custodian advises the Board on the suitability of laboratories wishing to become suppliers of data to the NDNAD.

In this latter instance, standards are set by reference to an external body, the United Kingdom Accreditation Service (UKAS), which assesses and, where appropriate, accredits laboratories seeking to supply profiles to the database. The ISO/IEC 17025 standards ('General Requirements for the Competence of Testing and Calibration Laboratories' and 'Supplementary Requirements for Accreditation in the Field of Forensic Science') along with the additional requirements stipulated by the Custodian are set out in the FSS document 'The National DNA Database Standards of Performance'. In summary:

All suppliers are required to use a documented protocol for DNA profiling which is acceptable to the Custodian. Suppliers must satisfy the Custodian that they are competent and licensed to use the technique, must adopt internal handling processes and procedures that conform to the rules of evidence, must carry out an internal quality assurance programme to the specification set by the Custodian and endorsed by the Home Office and must be UKAS accredited for their profiling services (UKAS 2001: para 2.4).

The nature of the overall assessment by UKAS is specified by reference to further UKAS documents and international standards (including NIS46, NIS96, ISO25, ISO9000 and ASO9001).

5.4.2 Laboratory quality assessment and assurance

In addition to setting the scientific and procedural standards to be maintained by suppliers of information to the database, the Custodian is also responsible for monitoring the performance of suppliers against those standards. The Quality Assurance Programme includes assessment of both 'declared samples' (where samples are submitted to the laboratory for criminal trials) and 'undeclared samples' (where samples are submitted by individual police forces as originating from criminal suspects). All instances of profiles supplied that are 'subsequently found to be in error'

(Forensic Science Service, 2000) are recorded by the Custodian who also facilitates the checking of all near-miss matches (matches on all but one allele). Successful completion of proficiency tests by all staff involved in DNA analysis in each supplier laboratory is a condition of continued accreditation.

5.4.3 Data handling, data protection and database security

The MOU outlines the duty of the Custodian to establish and maintain arrangements for the safe and accurate transfer of data between profile suppliers and the NDNAD as well as overseeing the accuracy, storage, management and deletion of profiles and the demographic data associated with them. Since March 2000, the Information Commissioner has been responsible for enforcing the provisions of the Data Protection Act (DPA) (1998) and ensuring that 'data controllers' (those who decide how and why 'personal data' are processed within their organisation) comply with its provisions. According to the DPA, 'personal data' includes facts and opinions about an individual, as well as information regarding the intentions of the data controller towards the individual. The Secretary of State and ACPO are designated as data controllers of the NDNAD, and the Custodian as 'data handler' is expected to ensure that access to, and use of, all records on the NDNAD and the PED are compliant with the Act. This includes the requirement to provide individuals whose information is contained on the NDNAD with details of any records that are covered by that legislation. The Custodian also provides a secure environment for the database and has 'disaster recovery plans' to deal with serious failures in IT, accommodation or personnel. Access control to information on the NDNAD is limited by password protection and security is 'layered to meet the requirements of data protection legislation' (Forensic Science Service, 2000: 9).

In some legal jurisdictions (e.g. Australia), the anonymity of profiles on the database is guaranteed by restricting information that would identify the source of the reference sample to the police force that supplied it. The arrangement in England & Wales is more complex. All persons arrested or summonsed are given a unique Arrest Summons Reference Number and barcode when police create a new record on the Police National Computer (PNC). Alongside the PNC record is an electronic CJ record on which is entered the same Arrest Summons Reference Number and barcode data containing the individual's name, date of birth, ethnic appearance code, gender code, police force in which the sample was taken, supplier laboratory, the type of DNA test and a numerical representation of the sample profile. The whole of the electronic record is transferred to the NDNAD by the police force which created it and the

relevant information is also provided to the supplier laboratory which completes further information regarding the DNA analysis. Each PNC record should also be continually updated to show the developing status of any DNA sample taken from the individual and be marked with the appropriate description: 'Taken'; 'Held in Force'; 'Missing'; 'Destroyed'; 'Profiled'; 'Confirmed'; 'Rejected – Resampling is Permitted'; and 'Rejected – Resampling is not Permitted'.

These informational arrangements have largely been established in order to ensure that all individuals who are eligible for sampling are contained on the NDNAD and that such individuals are not sampled more than once (although the first Annual Report of the NDNAD stated that there still remain a large number of replicate profiles on the database). Since 2001 there has been a computer interface between the PNC and the NDNAD to ensure that high standards of record keeping are maintained. However, there are some older records on the NDNAD for which there are no PNC records. There is no link between the PNC and the arrest records of Scottish police forces who export profiles for inclusion on the NDNAD, and there is no link between the PNC and samples and profiles given voluntarily since these individuals can not be given a record on the PNC. These arrangements for data management mean that identifying details about individuals are held on the NDNAD. The confidentiality of these details must therefore be secured by controlling access to information within the FSS itself and is not simply a matter for individual police forces.

5.5 Administrative accountability

The issues of judicial and scientific accountability described in the previous section are largely focused on the establishment, preservation and enhancement of the overall reliability of the NDNAD as an aid to criminal investigations in general. The efficiency of its routine operation and the effectiveness of its uses by individual police forces raise different questions. Although these questions have been a topic of discussion in the previous chapter, it is also important to note here that they have always played a central role in establishing and monitoring the framework and processes of NDNAD governance.

5.5.1 Procedure

Several sections of the MOU specify particular aspects of the relationship between the Custodian and its service users. For instance, the Custodian is expected to meet service level targets agreed with the Board, provide the outline of a charging regime (costs recovered through charges for specific services at a level agreed with the Board

and reviewed annually), and provide a 'help desk to deal with enquiries from the police and other suppliers about specific DNA profiles submitted to the NDNAD and other matters associated with Custodianship' (Forensic Science Service, 2000: 9). By far the most important aspect of the Custodian's procedural responsibility is that the loading, searching and matching of profiles on the NDNAD is carried out as speedily as possible so that information about matches reaches the police in a timely way. The MOU provides for speculative searches of newly loaded profiles against existing profiles to be made on a daily basis in order that any match identified is relayed quickly to the supplier of the profile. In addition, the MOU requires the Custodian to make provision for the 'one-off speculative searching' of scenes of crime samples that have provided insufficient allelic data to be permanently added to the NDNAD. Despite not being loaded, such profiles can be re-checked against databased profiles 'at agreed specified intervals' (Forensic Science Service, 2000).

5.5.2 Performance

Measurement of the effectiveness and efficiency of NDNAD performance has been modelled on widespread efforts by several government bodies to audit the delivery of forensic science and its usefulness to policing (as discussed in the previous chapter). The late 1980s and early 1990s witnessed a series of positive evaluations of the potential of forensic science to contribute to the effectiveness of criminal investigations and prosecutions. In particular, both the House of Commons Home Affairs Committee (1988-9) and the House of Lords Select Committee on Science and Technology (1992-1993) made strong arguments for the extension of existing budgetary provision for forensic science in support of crime investigation. These arguments rested on claims of cost-effectiveness, especially when compared with the costs of other investigative strategies, but neither Touche Ross (1987) nor the House of Lords Select Committee were precise about the possible level of efficiency gains or the general framework for measuring the contribution of forensic science to crime investigation and prosecution. The recent report of the National Audi Office (2003) suggests that there are continuing concerns about the timeliness of service delivery.

5.6 Civic accountability

We noted earlier that the agreement on the form and content of the MOU was achieved between participants in a small network of actors and agencies. For most of the policy makers, managers and users involved in that network, juridico-scientific and administrative forms of accountability have been of primary importance. In particular they have focussed on issues of 'evidential rigour', 'standard setting and quality

assurance' and 'efficiency, effectiveness and cost-effectiveness' as the central preoccupations of governance. Whilst issues of civic accountability have not been ignored, they have occupied a less significant role in structuring and informing the organisation and uses of the database.

Nevertheless, ACPO clearly recognises that the collection and retention of DNA profiles and samples raise some important issues regarding civic accountability that have not previously been raised by their ownership of other forms of personal information. ACPO has stated that:

> Police fully recognise the sensitivity of maintaining DNA data on individuals on the National DNA Database and we accept the need for high standards of probity/integrity at all stages of the process. That includes the need for DNA profiles to be removed from the Database whenever a person is acquitted in a case for which a DNA suspect sample has been taken or that case is discontinued for whatever reason. Police also acknowledge the concern that people have about genetic information held on the National DNA Database being misused for purposes other than those for which it is originally gathered and stored (ACPO Memo to House of Lords Select Committee on Science and Technology 2000 HL 115).

However, this memorandum identifies no particular measures designed to address the acknowledged 'concern' (and issues surrounding the removal of profiles following acquittal or discontinuance is no longer an issue following the 2001 CJPA). Elsewhere in the same memorandum, further elaboration of issues of public concern – and hence civic accountability – is foreclosed in by the rhetorical claim that all 'social, ethical, legal and economic implications of the National DNA Database should be viewed in the light of its enormous success in helping to prevent and detect crime'.

Elsewhere in the world, various bodies largely independent of operational policing and criminal justice administration have been set up to consider the more general social and ethical implications of the growth of forensic DNA profiling and databasing (as well as the claims made for their efficacy in support of criminal investigations). These bodies have sometimes been formed as commissions who have worked in advance of the establishment of national or sub-national forensic DNA databases (most recently, in the Republic of Ireland) and sometimes to provide oversight of their subsequent development and uses. When the 1993 Royal Commission recommended the

establishment of the NDNAD, although it provided no detailed discussion of its governance, it suggested the usefulness of an independent body with the remit to oversee forensic science. In addition, there have been several subsequent calls for the establishment of a body to exercise oversight of the NDNAD in particular. Most recently these have come from two significant public bodies. The House of Lords Select Committee on Science and Technology (2001: para 7.66) recommended that 'the Government should establish an independent body, including lay membership, to oversee the workings of the National DNA Database, to put beyond doubt that individuals' data are being properly used and protected'. The Human Genetics Commission (2002: 153) made several alternative suggestions of ways to make possible independent participation in the current arrangements for governing the NDNAD and to increase the transparency of its operation: '…at the very least, the Home Office and ACPO should establish an independent body, which would include lay membership, to have oversight over the work of the National DNA Database custodian and the profile suppliers'.

Until very recently, a reluctance to respond to such observations has meant that concerns identified as central to the civic accountability of forensic DNA profiling and databasing have not been fully addressed within the closed circle of NDNAD policy makers, managers and users. This set of concerns includes both general issues of independent scrutiny of the operation and uses of any such database, the appropriate degree of openness and transparency of its working, as well as more specific issues concerning the retention and permissible analysis of the original biological material and the extracted DNA from which database profiles have been constructed.

In July 2002, the Home Office announced that there would be a quinqennial review of the FSS. Although the original Terms of Reference for that review included no specific reference to the governance of the NDNAD, Robert McFarland, the leader of the Review was subsequently asked to consider the role of the NDNAD Custodian in light of the House of Lords and Human Genetics Commission observations mentioned above.

The final report recommended major changes to the status of the FSS, which in summary amounted to changing its status from an Executive Agency of the Home Office with Trading Fund status to a Private Public Partnership (with a short interim period of between 12 and 18 months as a Government Owned Company). McFarland also argued that as a corollary of these changes:

> the present custodian arrangements needed to be made more independent, more transparent and more accountable. The Review also acknowledges the concern over the fact that the Custodian role is not fully separate from that of the main supplier of DNA profiles to the database. Equally the Review accepts that there is an overriding public interest in maintaining the effectiveness and operational efficiency of the NDNAD. The Review is recommending that the NDNAD Custodianship is removed from the FSS. It is proposing that the NDNAD database becomes the responsibility of the NDNAD Board reconstituted into a (public sector classified) Company Limited by Guarantee (CLG), with an independent chairman but with a majority of the membership nominated by ACPO (Home Office 2003a: 3).

In the following sections of this chapter we discuss several of the main features of governance that arise from these recommendations.

5.6.1 Oversight

There currently exists no independent oversight or controlling body which is able to scrutinise either the management of the NDNAD, the formal roles organized and specified by the MOU, or the routine practices of the Custodian, analysts and 'owners' of genetic samples which are supplied, processed and used in relation to the NDNAD. This absence of independent scrutiny contrasts markedly with the governance arrangements for medical DNA databases in England & Wales. It is also significantly different from the arrangements for the oversight of forensic DNA databases found in some other legal jurisdictions. In such contexts it is generally agreed that oversight bodies are chaired by a respected public figure and that a board will include a substantial representation of individuals who are unconnected with database custodianship or use, but at least some of whom have professional knowledge of relevant scientific and criminal justice matters.

5.6.2 Openness and transparency

It is often asserted that the maintenance of public confidence, or trust, in the operation of forensic as well as medical databases is partly dependent on the openness and transparency of their operation. It is important for civil accountability that individuals or relevant agencies have sufficient knowledge about their detailed workings to arrive at authoritative judgements of claims made, for example, concerning the confidentiality of records, the security of the database, performance

levels, and the results of various quality assurance trials. Yet it is only recently that the first publicly available document has been circulated addressing these issues in relation to the NDNAD (National DNA Database Annual Report, 2002-2003*)*.

5.6.3 Research

Since the first introduction of DNA profiling into criminal investigations there have been constant research-based innovations in technologies affecting the collection, analysis and interpretation of tissue samples and their storage and interrogation within databases. The FSS is very often described as a world-leader in these matters, although the research and development capacity of an increasingly market-driven organization has often been described as problematic 'in the absence of long-term investment, direction and support from Government' (Roberts, 1996: 43). Whilst the MOU authorises the use of the NDNAD for 'specified research purposes to assist with law enforcement' (Forensic Science Service, 2000: 7), it is unclear what range of 'specified research purposes' may be allowable, what is included as 'use of the NDNAD' and what independent mechanism exists for the assessment and approval (including the ethical dimensions) of any proposed projects.

5.6.4 Samples

All samples are held in the laboratories in which the profiling was carried out. The individual Police Force that supplied the relevant biological material (as crime scene stains or CJ samples) assert property rights over this material and pay an annual fee for its continued storage. Crime scene samples should be retained by laboratories until the completion of a sentence served by the person convicted of the offence in relation to which the material was collected. In the case of CJ samples, retention will be indefinite. Important questions arise from the absence of formal arrangements governing detailed matters of ownership, use and long-term storage of these samples. Not least is the lack of an agency able to provide independent adjudication between the owners of the genetic samples and the individuals from whom they were originally taken (although any dispute over ownership could be subject to civil justice proceedings where genetic samples would be recognized as legitimate property).

5.6.5 Data-sharing

Genetic data used to represent individuality on the NDNAD are currently understood to have no additional diagnostic potential of interest to insurers, employers or medical practitioners. It is perhaps for this reason that NDNAD records are not characterized by the Information Commissioner as 'sensitive personal data'. However, the definition

which the Information Commissioner uses to characterize sensitive personal data could include NDNAD profiles. For example, the Information Commissioner states that any information regarding 'racial or ethnic origin' should be deemed sensitive and personal. NDNAD profiles are now used to infer ethnic origin and the use of technologies to make such inferences is likely increase in the future (we deal with this issue fully in Chapter 7). The Custodian of the NDNAD is subject to the 'principles of good information handling' as promulgated by the Information Commissioner which state that data must be: fairly and lawfully processed; processed for limited purposes; adequate, relevant and not excessive; accurate; not kept longer than is necessary; processed in line with the data subject's rights; secure; and transferred only to those countries who ensure 'adequate protection for the rights and freedoms of data subjects' (the EEA, made up of the Member States of the EU, Norway, Iceland and Liechtenstein, is already recognized to afford such protection).

However, recent developments in trans-jurisdictional genetic data-sharing raise additional issues to those of 'adequate protection for the rights and freedoms of data subjects'. Insofar as different jurisdictions have a variety of laws concerning the sampling, profiling and retention of DNA from different categories of individuals, some care will need to be exercised in the design and execution of any automated system of data-sharing (and in the legislation which authorises its use). Arrangements will have to be made which recognise each jurisdiction's legislative provisions and agreements will have to be made about which categories of reference samples may be searched for matches (e.g. 'convicted offenders', 'unconvicted suspects', 'voluntary samples' etc.). In the meantime, and in the absence of such arrangements, it seems likely that necessary trans-jurisdictional data-sharing will take place either on a case-by-case basis by means of one-off speculative searches or by the establishment of a dedicated international DNA database to which jurisdictions can add profiles that they believe to be relevant for international comparison (we address the future development of this practice in Chapter Seven).

5.7 Conclusion

At the time of writing it is not clear which of the current stakeholders in the NDNAD are involved in discussions of designing a new governance model. While it seems that the Government has accepted the bulk of the McFarland review recommendations, there has been no public announcement of the process by which a new model will be developed or who will be involved in any process once it is established. This is in marked contrast to the transparency with which the Interim Advisory (Ethics and

Governance) Committee on UK Biobank have made available their proposals for the governance of this large and scientifically important collection of genetic material.

Despite its eight year existence, the NDNAD Board only made its first detailed public statement about its operation in the NDNAD Annual Report in late 2003. In that report, both the Home Secretary and the Chair of the Board declare a commitment to openness, transparency and accountability, and recognise the importance of these values to the maintenance of public confidence in the NDNAD. The degree to which discussions of changes in its governance structure are themselves open, transparent, accountable and inclusive will provide an interesting test of the depth of these commitments. The Government have not issued the McFarland report as a fully public document (a copy has been deposited in the House of Commons library) and this limits the circulation of the information it contains. Of central importance to any decisions about a new governance framework will be a range of ethical considerations which have been engendered by the use of the NDNAD. The next chapter addresses these explicitly.

Chapter Six

Ethical Issues

6.1 Introduction

When the Royal Commission on Criminal Justice (1993) recommended the introduction of legislation to support forensic DNA databasing in England & Wales, its enthusiasm for DNA profiling was fuelled by affirmations of the social benefits promised by its use. Central to this was the potential for DNA profiling to ensure greater fairness and parity within the criminal justice system through the 'scientific objectivity' it added to existing investigative methods and prosecutorial resources. Yet the Commission also recognized a number of additional ethical concerns raised by the development of this new apparatus and its use by the police. Most notably the Commission identified potential assaults on individual liberty arising from the compulsory taking of bodily samples and from the retention and continuous speculative searching of DNA profiles on databases. Claims for the social benefit of databasing on the one hand, and critiques of its potential harmfulness on the other, have been subsequently deployed in commentaries by a number of key individuals and organizations since the establishment of the NDNAD (although more attention has usually been given to the first of these two sets of arguments).

6.2 Privacy

The most common ethical objection made to the expansion of forensic DNA databasing has been that it threatens the privacy of individuals whose profiles it contains (and individuals who are their close relatives). However the meaning and importance of such an objection is the subject of wide debate. This is partly because there are many different understandings of the concept of privacy across academic and legal contexts (e.g. as either 'condition' or as 'right') as well as of its component parts (e.g. as 'physical inaccessibility', 'informational inaccessibility', 'spatial separateness', etc.) but it is also because of the degree to which other words are used either as synonyms for 'privacy' or as more generic concepts within which 'privacy' may be located (e.g. 'autonomy' or 'integrity').

There is insufficient space in this report to provide a definitive catalogue of these alternatives and their different uses in arguments about forensic DNA databases in

general and the NDNAD in particular. Instead, the following sections of this chapter focus on the two most important senses of privacy that have recurred in discussions of the latter: 'bodily privacy' (in particular the legitimacy of access to the body of individual subjects in order to collect samples of genetic material) and 'informational privacy' (in particular the legitimacy of the collection, storage and use of genetic information derived from such samples).

6.2.1 Privacy and the law

Whilst privacy in English law is a notoriously problematic concept, fraught with both conceptual and doctrinal difficulties (Roberts, 2001), legal recourse to the 'right to privacy' in England & Wales has been possible since the de facto incorporation of the European Convention on Human Rights (ECHR), through the Human Rights Act (1998).

Article 8.1 of the ECHR states that: 'Everyone has the right to respect for his private and family life, his home and his correspondence'. Nevertheless, this right, assured by Article 14 to cover every citizen, is designated as a 'qualified right' which needs to be balanced against the rights of others or the interests of the collective. These qualifications are outlined in Article 8.2:

> There shall be no interference by a public authority with the exercise of this right except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic well-being of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.

The 'traditional' balance in the UK, to retain personal information (such as fingerprints) from convicted individuals in order to provide future intelligence for the detection of any further criminal offences, is typically justified as a proportionate breach of privacy under these terms. The retention of such information taken from those already proven to have been involved in crime is expected to improve the chances of detecting them if they persist in a criminal career (and possibly even deter them from future involvement in crime), and thereby serve to protect the freedoms of others who would otherwise become their victims. Understood this way the ECHR becomes an important mechanism for assessing the conditions under which a legitimate breach of individual privacy is acceptable.

6.2.2 Privacy and the NDNAD

Opinions differ on whether the establishment and expanding uses of the NDNAD constitute a violation of legitimate expectations of privacy or, in the language of the ECHR, whether some or all of its uses amount to the exercise of unreasonable, unjustifiable and arbitrary – that is disproportionate – police investigatory powers. In considering such a question, it is relevant to ask whether the new powers first given to the police by the CJPOA (1994) raise additional, or different, ethical concerns than those arising from their previous powers to collect and retain other forms of personal information about suspects during the course of criminal investigations. In particular, whether DNA samples or profiles are intrinsically 'more private' objects or their collection involves greater infringement of bodily integrity than, for example, fingerprints or photographs. A positive answer to this question has been central to those who have criticised the new powers since 1994. For example, Mooki argues that:

> Unlike fingerprints, which only carry information regarding the physical distribution of lines that are peculiar to one individual, the information in blood is more sensitive in that it not only relates to the individual concerned but also has a bearing on his blood relations. For example, it would be possible to use DNA to test for a predisposition to genetic-linked diseases that run in families (1997: 576).

This argument, found in many similar commentaries, asserts that DNA differs from all other biometric identifier collected by the police. There are two main reasons for this: the first regards the informational distinctiveness of DNA which unlike fingerprints, for example, carries sensitive and personal data about the person from who it was taken; the second relates to the capacity of genetic material to reveal information not only about the person from who it originated but also about those who are biologically related. It is this data-richness of DNA which, some have argued, necessitates special consideration of the ethics of 'genetic privacy'. Allen (1997) distinguishes four key components of what is often asserted to be the right to genetic privacy: first, the right to privacy of information (which includes subsidiary rights to confidentiality and anonymity); second, the individual's right to control physical access to his or her body; third, the right to be able to exercise personal and discretionary control over the use of genetic services; and fourth, the right to maintain proprietary privacy rights over one's own genes. Annas (2001) has argued that because DNA is akin to a 'future diary' of ourselves (it contains information about our present and future medical

conditions) our right to protect it from unwanted 'readership' is imperative in order that we maintain autonomous control of personal and sensitive information.

In contrast to this view there are those who argue that, whilst DNA is capable of being a rich source of information about individuals and their close biological relatives, perceptions of its significance may be informed by wide-spread misunderstandings about the kinds of knowledge that can be obtained from its interrogation. As Martin Richards argues, this arises:

> from a belief that DNA technologies deal in the fundamentals of our humanity – the secrets of life. But it is the ways in which some biologists have described molecular genetics that has created this misleading conception of the properties of DNA and so fed the public resistance and distaste for some of the genetic technologies (Richards, 2001).

Thomas Murray also criticises what he terms an unacceptable 'genetic exceptionalism' as:

> an overly dramatic view of the significance of genetic information in our lives. It is a reflection of genetic determinism and genetic reductionism at least as much as the product of genuinely distinctive features of genetic information (1997: 71).

6.2.3 Situating ethics

The ideal of individuals exercising autonomous control over the taking and use of their genetic material plays a central role in the Human Genetics Commission (HGC) (2002:14) 'respect for persons' framework which asserts the necessity for informed consent in the sampling of genetic material for medical research purposes to ensure that the 'donation' of DNA is an altruistic act by each individual. However, in the investigative and prosecutorial uses of DNA the right to withhold consent or to control the subsequent use of samples and derived profiles is rarely available. Indeed, the overwhelming majority of genetic samples obtained within the criminal justice process are not 'donated' by individuals but 'taken' by the police without consent. Whilst the HGC recognize the legitimacy of this method of collection they continue to assert the argument that DNA is a distinctive biometric identifier which requires separate ethical scrutiny.

Whilst debates about claims to 'genetic privacy' are of fundamental importance, a number of subtle distinctions need to be made when considering their relevance to the collection of DNA samples and the databasing of DNA profiles obtained and retained by the police under a variety of circumstances. Our aim in this chapter is to explore this more complex terrain and the distinct ethical questions that arise at different places within it. We therefore give separate attention to the practice of DNA sampling (that is, the collection of DNA from both crime scenes and from individuals), the retention and use of such samples, and the loading and searching of the profiles derived from them on the NDNAD.

6.3 Sampling

The practice of sampling DNA, carried out by both police officers and a range of crime scene personnel through England & Wales, constitutes a distinct aspect of the uses of DNA for forensic purposes. Whilst DNA sampling is the necessary preliminary to the loading and searching of profiles on the NDNAD, the practices and procedures of sampling themselves raise distinctive ethical issues. These issues are further differentiated by the fact that DNA samples are derived from two different sites: from scenes of crime and from individual suspects.

6.3.1 Crime scene samples

It may be difficult to think of any circumstances in which ethical considerations should run counter to the police's legitimate authority to collect human tissue samples from crime scenes for DNA profiling in support of their investigations. In English law bodily material left at crime scenes, which has not originated from the victim, has the status of 'abandoned property' and ownership claims cannot be made by the person who left it. Nor can it be protected under any right to privacy. However, the collection of biological samples from crime scenes is carried out under a range of different circumstances. For this reason it may be worth identifying these circumstances and considering some of them separately in order to focus in more detail on the kinds of ethical issues that can arise in relation to the use of DNA technology.

Crime scene examiners, medical personnel, and police officers regularly have to collect what they believe to be tissue or fluid left by a suspect on the bodies of those who have been subject to an attack. In such cases the victim may be either alive or dead. In the case of a surviving victim of violence a non-intimate examination may be carried out by police investigators and intimate examinations by medical personnel. Under these circumstances consent must be obtained from the victim for bodily examination

to be undertaken. This form of crime scene DNA collection therefore places the police in a social and ethical relation with victims since their DNA will normally be collected as part of the same process. This is also apparent in the case of a fatality where crime scene examination may be carried out on behalf of a coroner to obtain DNA from a corpse.

It could be argued that the collection of DNA under these circumstances poses no additional concerns to those raised by the routine collection of any forensic evidence from a victim's body. Indeed, this is true to the extent that both intimate and non-intimate examinations are a long established and integral aspect of policing, where DNA collection is a recent and additional factor. Nevertheless, these practices are rarely addressed in any of the debates regarding the use of DNA by the police.

Even in cases of property crime it is possible that samples taken during crime scene examinations may include the DNA of the victims of the crime in question. For instance, at the scene of a burglary or car theft a crime scene examiner will take swabs from a variety of surfaces in order to collect human tissue for later profiling. Crime scene examination practice in most police forces does not include the necessity for investigators to collect elimination DNA from the victims of property crime. Whilst examiners may question victims about the likelihood that material recovered (e.g. from blood or from saliva deposited on a range of items) may have originated from them, no objective test is used to exclude this possibility. The result of this common practice is that profiles of victims of crime may well be loaded onto the NDNAD. There have been verbal reports from other jurisdictions that victim DNA sample profiles taken for elimination purposes in cases of sexual and other assaults have been loaded onto their databases. This should not happen in England & Wales, since victim samples are collected using 'evidential kits', but there is no method to ensure errors have not occurred. Consequently, such profiles could be entered onto the NDNAD and remain there as unmatched crime scene profiles.

An additional concern that has been raised by crime scene sample collection practices relates to the kinds of analysis to which such DNA samples may be submitted. Whilst NDNAD profiles are generated from the analysis of non-coding regions of the genome, it is not unusual to read of promises or anxieties about the possible future use of DNA for phenotypical analysis (that is, analysis that will reveal visible physical – or even behavioural – attributes of a suspect). Whilst these possibilities remain largely unrealised (with some very limited exceptions), some view their development with

unease. Recent research on 'genetic ancestral origins' has also suggested ways in which profiles assembled from the current suite of uninformative STR loci can themselves be interrogated to determine the probability of an individual's membership of particular population groups. Finally there has been concern that other genetic information derived from analysis (that is, other than the DNA profile) will be used to narrow the search of datasets and records already available to the police or to support judicial requests for the interrogation of medical or research genetic databases (we explore these concerns more fully in Chapter Seven).

6.3.2 CJ sampling

The question of which 'suspects' should be subject to sampling, and under what circumstances, has been central to the enactment of legislative provision since the Royal Commission on Criminal Justice (1993) and the subsequent CJPOA (1994). Legislative provisions since that time have continually widened the 'pool' of individuals from whom CJ samples can be taken and the current provision affords the police the power to sample from any individual arrested on suspicion of a recordable offence.

As we previously noted in Chapter Three, the CJPOA significantly redefined the power of the police to obtain non-intimate DNA samples from those charged with a recordable offence regardless of whether such a sample could prove or disprove involvement in that offence. The CJPOA created a formal similarity in law between 'bodily samples' and fingerprint impressions. The authority to collect fingerprint impressions, unlike bodily samples, from criminal suspects was never wholly dependent on the availability or potential relevance of fingermarks to the investigation or prosecution of the particular crime in question. Instead, the wider uses of such fingerprints for the cataloguing and verification of identity (especially of those designated as 'repeat offenders') and for the investigation of potential future crimes was always central to the drive to their collection and storage. These pragmatic principles of collection and storage were transferred to the sampling and retention of bodily samples.

Some questions were quickly raised regarding the provisions of the CJPOA for bodily sampling in relation to offences where information derived from samples would have no evidential value for the case under investigation. For instance, Mooki argued that the extension of police powers under the CJPOA created 'a direct link between greater interference by the state with the bodily integrity of individuals' (1997: 574). In relation to such bodily interference, Steventon argued that the benefits derived

from taking samples for *all* recordable offences was not obvious and that it 'may be considered a disproportionate interference with an individual's rights and thus significantly harder to justify' (1995: 418).

However, the authority to collect both fingerprints and non-intimate samples from those lawfully charged on suspicion of involvement in a recordable offence was seen by most to be a proportionate breach of the liberty and privacy of a criminal suspect (a breach tempered by the requirement to destroy them on discontinuance or acquittal). Some commentators, whilst acknowledging the legitimacy of the new powers, did question the extent of them: 'it is not obvious that the powers given to the police to take samples from suspects are unacceptable, although it is arguable that, in applying to a number of trivial offences, they are rather too wide' (Redmayne, 1998: 444)

Whilst recent debates about the Criminal Justice Act (CJA) (2003) gave consideration to the retention of samples and profiles on the NDNAD they did not question the extension of police powers to collect them. Yet, the CJA significantly changes sampling arrangements because it allows the police to take samples without consent at an earlier point in the investigatory process – that is, at the point of arrest rather than at the point of charge. The House of Lords, who were fundamentally opposed to this measure during their reading of the Bill (we detail this below), did not contest the extension of police powers to sample *per se*. This is because the justification offered by the Home Office for the extension of sampling powers, which is that it will allow the police to more quickly establish the identity of suspects once they are brought into custody (and to counter their attempts to give false details), was generally accepted without argument. Yet, whilst this justification is plausible in relation to the taking of fingerprints (current 'Livescan' technology allows a fingerprint to be obtained and immediately compared to the computerized records held by the fingerprint bureau) it is a more difficult case to make in relation to DNA since there is no current technology that can allow for the police to obtain a DNA sample and immediately compare it to an existing database record.

A central ethical question raised by the non-consensual taking of DNA samples by the police relates to the necessity for justifications of breaches to the bodily integrity of an individual during criminal investigations. The right to bodily integrity is enshrined in English law where the police have no right to obtain an intimate sample if a suspect refuses to consent to its taking and can appeal to no higher authority to contravene

an individual's wishes. We have earlier described how the CJPOA changed the status of the mouth swab in 1994 by reclassifying it from an intimate to a non-intimate sample. This reclassification effectively altered the ethical landscape of the body. Whilst PACE has long permitted police access to mouths (for example to recover suspected drugs by forcing the subject to spit out something held there) the legislative change to allow the non-consensual insertion of a probe constituted a fundamental alteration in the status of the mouth. It is surprising that this significant change has received virtually no attention outside of a limited academic community. There has been virtually no official Government or ACPO commentary on the ethical issues involved in further extending the powers of the police to sample in this way, although there have been observations on the financial savings that have resulted from the fact that this sampling method (unlike those applicable to the taking of intimate samples) can be carried out by police force employees – often civilian employees - without medical qualifications.

In fact, the vast majority of social and ethical commentaries surrounding DNA profiling by the police have not focused their attention on the ethics of sampling but on the ethical issues raised by the retention and subsequent use of samples and profiles beyond the investigation of the original offence in connection with which they were taken.

6.4 Retention

The legislative provision which enables the NDNAD to operate effectively is built around powers afforded to the police for the retention of bodily samples and derived profiles. At present samples taken from an individual arrested for a recordable offence, and any profiles derived from it, may be retained indefinitely by the police. The existence of such powers allowing indefinite retention has given rise to ethical arguments that are somewhat different from those that relate to sampling. In addition, issues of retention relate to both the *storage* of samples and profiles (in laboratories and on databases) and also to their *uses*. Whilst the authority to store these two different materials and informational artefacts raises a range of questions about both confidentiality and security, the authority to use them raises further issues about the permissible variety of such uses and their justification as proportionate to the detection and prevention of crime.

6.4.1 The storage of samples and profiles

In response to the CJPOA, Steventon argued that

> the new provisions which allow information to be retained on persons convicted of any recordable offence, are clearly wider than those endorsed by the [Royal Commission on Criminal Justice], and it is the extensive nature of the new provisions which may be considered to be an unjustifiable infringement on an individual's privacy (1995: 417).

In the subsequent debates about informational privacy since that time it has been common to make a distinction between the retention of human tissue samples and the DNA profiles which are derived from them. Such a distinction is grounded in the different ideas about what DNA (and any derived profile) can tell us about individuals and, as we noted above, is framed by conceptions of DNA as exceptional or minimal in its informational distinctiveness.

For example, the Government and the Home Office frequently cite the informational distinctiveness of profiles and samples to respond to questions about genetic privacy. In particular they routinely describe the content of the NDNAD (that is to say, the profiles) as information-minimal. The Home Office description of a genetic profile as an identifier akin to a 'barcode' or 'car number plate' seeks to allay privacy fears through the depiction of DNA as an 'empty signifier', a biometric that allows for the measurement of a property-less individuality . The Government and ACPO regularly argue that the use of non-coding regions of the genome produces genetic profiles that pose no significant threat to individual privacy since they contain virtually no personal information.

It has been common in the UK and elsewhere to talk of the current repertoire of forensic STR loci as being 'junk DNA' that cannot disclose any genetic information about an individual. However, there is evidence that at least one currently used marker can be linked to a particular medical condition (type 1 diabetes). If any of the loci currently used in forensic DNA profiling become established reference points for the diagnosis of further medical traits in the future, then it may be necessary for all stakeholders in the NDNAD to revisit their understandings of the adequacy of current arrangements for ensuring informational privacy. Alternatively, the FSS may need to consider using a different set of STR loci. The loci which are currently used were chosen only because they were the first to be discovered. However the advent of the

entire human genome sequence has made it possible to access tens of thousands of STR loci allowing a choice of markers in regions remote from genes and where the underlying biology of the local DNA region makes an inference of medical conditions much more unlikely.

At present, the extent of concern regarding the storage of DNA profiles remains significantly less than that of the retention of biological samples. There is a broad consensus in England & Wales that the retention of samples is of greater significance because of the potential to derive sensitive genetic information from them and the possible (mis)use to which such information could be put. Current legislative limits (which state that samples must only be used by the police for the detection and prevention of crime) do not offer, some argue, sufficient safeguards against potential abuse and subsequent assaults on individual privacy. Since samples themselves (unlike the profiles produced from them) are not designated as 'information', they are not covered by the provisions of the Data Protection Act (1998), and the individuals from whom they were taken have no method of controlling their use once they are held by the police. The HGC, along with human rights groups such as Genewatch, Statewatch and Liberty, have recommended that samples be either removed from police ownership or destroyed once an adequate profile has been generated from them.

Liberty argues that the retention of DNA samples poses a significant threat to privacy:

> In contrast, to fingerprints and DNA profiles, the physical *samples* which are retained and used under PACE (swabs etc.) and from which DNA is taken, potentially contain very much greater, more personal and detailed information about an individual. This may include highly private matters such [as] information about a latent genetic illness, or the birth gender of a transsexual person. It may even reveal behavioural tendencies, or important information about the individual that he does not even know about himself such as the true nature of his familial relationships. The 'knowledge' in relation to an individual's life that can be gleaned from DNA samples has no parallel in the history of science and raises profound questions about the protection of privacy in the 21st Century (Liberty, 2002).

Such concerns about sample retention are widespread, and the HGC have recommended either the destruction of samples currently held by the laboratories who undertook their analysis on behalf of the police or their relocation under

alternative oversight. There is a majority consensus among those concerned with issues of security and confidentiality that either change in arrangement would be a welcome step. Whilst the Government contend that the retention of samples is a necessary component of databasing the arguments in favour of sample destruction are more persuasive. Storing samples not only requires greater practical security but also produces storage costs from the processing laboratories which are passed on to the police. Whilst there is judicial value in the retention of crime scene samples, which may be needed for the purpose of future profiling during appeals, there is no significant advantage in retaining CJ samples. A number of agencies have argued that the retention of samples is vital in relation to the necessity of re-testing using new platforms. Such platform changes may involve either the introduction of new STR loci for analysis or, more radically, the move to SNP technology. However, the justification for retaining samples in case of a change in profiling technology is rendered weak by current research (we address this issue in the next chapter).

For many human rights groups the destruction of samples would be a significant step in maintaining public confidence at a time of seemingly expanding technological capacities. Yet, for some, the destruction of samples or their removal from police ownership in favour of the retention of only profiles would still be inadequate. Liberty and Genewatch, for example, argue that the issue of data security and confidentiality is less important than the privacy issues invoked by the retention itself. Liberty argue that the question of security is a 'red herring' because it does not engage with the central issue of the loss of privacy which is created by involuntary sampling and storage. This loss of privacy cannot, they argue, be rectified through the construction of secure informational archives but only through a restoration of the principle of a right to bodily privacy. Liberty proposes a return to the arrangements of the CJPOA which curtailed the retention of samples and profiles to those obtained from the convicted. Such a proposal would serve to re-establish an earlier accepted balance between individual rights and state powers – a balance, it should be remembered, which is deemed appropriate for DNA databasing in Scotland.

The Parliamentary Joint Committee on Human Rights (JCHR) recently considered the arrangements for data security and integrity in the NDNAD. In asssing the extension of police powers under the CJA they argued that there is a:

> risk that the arrangements for managing the hugely increased volume of personal data which would become available through the operation of the

> proposed new powers would be inadequate to secure compliance with ECHR Article 8 (2003: 24).

The legitimacy for the extension of police powers depends, they argue, 'on the adequacy of the processes for safeguarding the accuracy and security of the data and for ensuring that they are used only for the legitimate purpose of preventing and detecting crime' (2003: 22). The JCHR raises a significant issue about the security and confidentiality of samples collected and retained from 300,000 people per year who have not been charged with, nor convicted of, a recordable offence.

The issue of data security can be seen as a pivotal concern which relates to the integrity of every sample and profile on the database and the need to ensure that adequate procedures are in place for restricting access to them. The 1993 Royal Commission on Criminal Justice took this matter very seriously and recommended that an independent body be given responsibility for database operation to monitor and safeguard access. As we have already discussed this was never considered a workable proposition and so the database has been managed and overseen by those who have most at stake in its practical utility. However we have already noted that the current restructuring of the FSS will require new arrangements for the custodianship, management, and possible oversight, of the NDNAD. This is the most appropriate moment for a transparent appraisal and public assessment of the structure of the NDNAD alongside a formal charter designed to ensure the integrity of the data contained on it.

6.4.2 Speculative searching

The CJPOA gave specific authority for the continuous speculative searching of all newly loaded profiles against all existing profiles held on the NDNAD. As we argued in a previous chapter this form of searching the database is *not* an inevitable outcome of the retention of DNA samples and profiles within the criminal justice system but, rather, is a specific technique devised to use those retained profiles. However, the vast majority of commentators in England & Wales have not viewed such continuous speculative searches as ethically problematic. Rather, the debate has been structured by the question of who should be subject to such a procedure. These questions, as Beyleveld (1997) argues, are not distinct to the question of police uses of DNA but reflect well established disputes about the purpose of the criminal justice system and the normative relationship between the individual and society.

In most European jurisdictions, as Guillén (2000) argues, concerns about potential of offender recidivism have been the major determinant of the regulations governing DNA retention. In other words, it is particular types of offenders, and the risks they pose, who are subject to this form of criminal administration. The establishment and expansion of the NDNAD in England & Wales was informed by such considerations, and the continuous speculative searching of DNA profiles obtained from this category of individuals was understood to be the major contribution it could make to the detection and prevention of their criminal activity.

In one instance, a focus on the danger posed by the possibility of recidivist offenders was used to justify the retrospective application of current sampling and retention practices. The Criminal Evidence (Amendment) Act (CEAA) (1997) empowered the police to obtain DNA samples from a range of individuals who were already convicted (or held under the Mental Health Act) prior to the CJPOA and who were still incarcerated. The CEAA served to retrospectively extend powers granted under the CJPOA so that a number of prisoners – namely those convicted of violent or sexual offences – could be sampled and entered onto the NDNAD. The justification for these retrospective powers, to 'mop up' those convicted of sexual or violent offences prior to 1994, was that such offenders often have a history of recidivism and a high chance of re-offending after release; or, as Ian Brownlee puts it, 'the taking and recording of DNA samples was specifically intended to operate as a form of "biological tagging" of sex offenders for preventative as well as investigative purposes' (1998: 416). Extending police powers to sample and retain DNA from individuals in this manner was argued to be a proportionate response to these types of serial offenders with a history of sexual violence. Unsurprisingly, this particular extension of police powers attracted little attention, let alone objection.

For some commentators the differentiation of 'serious' and 'minor' crimes for the purpose of databasing is unimportant and the actual existence of *any* archive which is speculatively searched by the police raises the most serious ethical concerns. Bereano (1992), for example, argues that limiting the use of DNA to crime scene collection and individual case work (where a DNA sample is taken from an individual already suspected of a crime in order to provide a comparison with crime scene material) is ethically viable because it can be justified as a breach of privacy in relation to each legitimate investigation. However, he argues, the databasing of a permanent set of records used for 'fishing expeditions' to find suspects erodes this aspect of civil liberty. This reflects a more general concern that speculative searching on the NDNAD is a

mechanism of surveillance which is being used to continually monitor individuals. It is present in regular assertions (predominantly from human rights and civil liberties groups) that the NDNAD contributes to the creation of a 'suspect society' whereby certain individuals are deemed to be suspects and not citizens (see Williams & Johnson, 2004, for a discussion of the issue of surveillance). Yet, as we outlined in an early chapter, the investigative potential (as opposed to the prosecutorial usefulness) of DNA on a case-by-case basis in the absence of a suspect (or a small number of suspects) is more limited.

There are those, most recently and notably Alec Jeffreys, who have argued that the operation and use of the database should be radically restructured to limit speculative searching by the police. Jeffreys' view is that upon collection of a DNA sample, and its search against the NDNAD, the police should be unable to access information relating to individual identity if a match is made. Access to names and addresses should be, he argues, held on a separate database and only be accessible after a court order has been issued. For Jeffreys, this is an important ethical safeguard because it transfers particular powers from the police to another authority which may potentially ensure higher levels of confidentiality and data security through independent administration. However, such a situation would be highly undesirable for the police because it would limit both the immediacy and automation of the database to provide a named suspect and it is impossible to imagine the NDNAD as an effective investigative instrument if it cannot be used to continuously speculatively search all newly profiles against those already held.

However, it is also possible that public confidence in this practice may be prejudiced by the most recent changes authorised by the CJPA (2001), and extended by the CJA (2003), which allow for the retention of fingerprints and samples of individuals who have not been convicted or charged with any recordable offence. These measures have created a significant increase in public debate about the ethical issues raised by speculatively searching an archive made up of, what Liberty refer to as, 'innocent ex suspects'. The NDNAD, regularly referred to by the FSS as including a 'suspect database' prior to 2001, now contains the profiles of an increasing number of persons who have never been convicted of offence (including the 50,000 such individuals whose profiles, according to HMIC (2000), had been retained illegally before the 2001 legislation retrospectively authorised their retention).

Yet in considering the justification for the social benefits of the retention and use of samples and profiles of those not convicted it is important to remember how such arrangements came about. We described the background to the CJPA in a previous chapter and the significant cases in which appellants' convictions were overturned due to a Court of Appeal ruling that DNA evidence - obtained after initial matches were made on the NDNAD using illegally retained profiles - was inadmissible. By 2000 Charles Clarke, then Minister of State at the Home Office, was describing these events as the outcome of a 'legal loophole' which allowed those charged with serious offences to be acquitted. There was in fact no loophole: the law was clear on the point of the retention and destruction of fingerprints and samples. What had arisen was an embarrassing situation in which police error (the failure to remove profiles and destroy samples) had allowed continued speculative searching of illegally held profiles to contribute to a criminal detection but which, when presented as evidence in court, produced a significant problem. The result was that appellants' convictions were quashed by the Court of Appeal who interpreted section 78(1) of PACE to argue that the admission of DNA evidence obtained in this way would have an adverse effect on the fairness of a hearing.

In the House of Lords' later consideration of *R v B* and *R v Weir* (Attorney General's Reference No. 3, 1999) it was ruled that breaches of the CJPOA and PACE could *not* be used to justify an exclusion of evidence even if the police had used an illegally held profile as the basis for obtaining it. The Lords described the Court of Appeal ruling as an 'austere interpretation' of the legislative framework and ruled that the decision was wrong. In considering the case, The Lords also explicitly addressed the question of the infringement to privacy which defence counsel contended was substantiated by Article 8.1 of the ECHR. The Lords did not recognize any such infringement and argued that:

> It must be borne in mind that respect for the privacy of defendants is not the only value at stake. The purpose of the criminal law is to permit everyone to go about their daily lives without fear of harm to person or property. And it is in the interests of everyone that serious crime should be effectively investigated and prosecuted. There must be fairness to all sides. In a criminal case this requires the court to consider a triangulation of interests. It involves taking into account the position of the accused, the victim and his or her family, and the public (Attorney General's Reference No. 3, 1999).

Whilst the description of a 'legal loophole' might have been permissible to describe *R v B* and *R v Weir* as examples of an imbalance of justice (because there *was* compelling evidence against the defendants) its use to justify the retention of *all* samples and profiles from unconvicted individuals is significantly different. This justification now permits the indefinite speculative searching of all legally obtained DNA profiles.

6.4.3 Voluntary elimination samples

The vast majority of genetic samples taken by police officers in England & Wales during the course of criminal investigations may be obtained without consent. Yet the police regularly seek to obtain samples with consent for the purposes of elimination. Some of these will be taken from known individuals who have to be eliminated as a possible source of DNA recovered from a crime scene. In other cases, the police may undertake an 'intelligence-led screen' of varying numbers of individuals who may be defined as potential 'suspects' in so far as they share one or several features (e.g. occupation, geographic location, age, etc.) with the person who the police believe committed a crime under investigation.

In providing a DNA sample as part of such an intelligence-led screen, individuals eliminate themselves from, or implicate themselves in, the further investigation of a crime. Government ministers have expressed the 'commendable solidarity and community spirit' during intelligence led screening which displays a sign that 'each and every one of us takes responsibility for the welfare of others' (Paul Boateng, House of Commons, 10th March 1999). Yet, whilst any help which an individual may provide to the police during the course of an investigation may be considered to be 'community spirited' the act of providing a genetic sample has only one purpose: the elimination of that individual as a suspect of investigation. Unlike other types of information provided to the police (for example witness testimony) it cannot advance a criminal investigation by providing clues about the identity of an offender. It should also be noted that samples are requested from specific 'pools' of individuals and not from a whole 'community'.

The proposal to retain samples and profiles obtained with consent from volunteers was regarded as problematic within Government when it was first discussed in 1999. For instance, Paul Boateng argued that samples and profiles taken from volunteers should not be included on the NDNAD, but be destroyed at the end of a police inquiry because of the 'fundamental civil liberties issues involved' (Hansard, 10th March 1999).

However, Boateng also added the caveat that he was giving consideration to the voluntary retention of DNA profiles on a 'separate database'.

The idea of a separate database emerged as an early alternative to the destruction of samples given voluntarily. According to key stakeholders, many individuals had previously volunteered their sample to be stored on the NDNAD in order that it could be used for future elimination during criminal investigations but, prior to 2001, such retention was not permitted by law. It has been suggested that these individuals, who might often be identified as the 'usual suspects' in police investigations, favour voluntary submissions to the NDNAD in order to more quickly eliminate themselves from investigation. The example often given is that of a frequently suspected paedophile who submits a forensic sample in order to allow the NDNAD to 'remotely eliminate' him from suspicion should a crime against a child be committed in his geographical area. A similar suggestion was made by the Association of Chief Police Officers in 2000:

> In recent years, over 40 serious crimes have been solved as a result of intelligence-led screens using DNA profiling from volunteers. Interestingly, suspects who have been approached on more than one occasion to volunteer samples (eg suspected or convicted paedophiles) following a child murder or other serious sexual offence, have variously queried why their voluntary DNA sample cannot be retained on a Database for future reference even though they have been eliminated from the specific enquiry for which the DNA sample was taken. The law currently does not allow that but it is an illustration that suspects themselves acknowledge the value of DNA profiling in combating crime and rather than be troubled on several occasions to provide volunteer samples, they would prefer police retain their original voluntary sample (Written Evidence to House of Lords Science and Technology Select Committee, 2000).

The example of the paedophile is highly problematic. It implies that a known suspect who voluntarily submits a sample to the NDNAD will remain (on the condition that he commits no offence) untroubled by further police investigation. This relies on an inaccurate set of ideas about how the NDNAD is actually used during police investigations. The NDNAD is an intelligence tool used to compare DNA profiles between individuals and crime scenes. In this respect the idea of 'remote elimination' is hardly feasible because the existence of DNA at a crime scene will not automatically

serve as the basis to exclude a known suspect from potential investigation even when his DNA profile does not match that found. Furthermore, there are many relevant cases in which no DNA intelligence will be available to investigators (especially so in the case of missing children).

Nevertheless, the claim that some criminal suspects themselves requested the storage of their profiles on the NDNAD is a powerful resource for arguing that such retention should be permitted. The CJPA makes this retention possible and the police can now seek consent to include voluntarily obtained DNA profiles in the NDNAD. The misgivings which Paul Boateng had displayed, along with the idea of a 'separate database', disappeared with the 2001 legislation. Yet the arrangements for retaining voluntary samples in England & Wales remain contentious. When the police request that an individual provide a voluntary sample they may obtain two types of consent: the first is that the individual consents to the comparison of their DNA profile with the profiles obtained from a specific crime scene; the second is that the individual may consent to the sample being retained and the profile added to the NDNAD where, as a result, it will be continuously speculatively searched. It is important to note that the legislation makes this second form of consent irrevocable so that, once a voluntarily provided sample is loaded onto the NDNAD, the donor loses the right to subsequently have it removed.

The HGC have argued that making consent irrevocable 'appears to run counter to the normal approach in medicine or research' (2002: 150). Donation and consent in medical research may be rescinded, ensuring the donor of the right to control the use of private data, whereas in the forensic context such a right is revoked.

A question then arises: why would individuals provide this form of consent given its irrevocable nature? The HGC are concerned that there 'would appear to be considerable potential for a form of coercion' in gaining an individual's consent (2002: 151). The HGC expressed concerns about the actual procedures used by the police to obtain consent, such as the design of the forms that individuals are asked to sign and The Home Office have subsequently issued guidelines which seek to standardize the way in which the police should obtain consent by using two separate and clear forms of wording. Yet the HGC have continued to argue that the consent obtained from volunteers may be given 'without proper advice on the long term implications' and that this 'might happen against a somewhat intimidating background concern about

being implicated in a crime or recently having been the victim of, or witness to, a crime' (2002: 151).

6.4.4 Research uses of DNA

Concern has been expressed regarding the potential research uses of genetic samples by forensic laboratories. 'Research uses' in this context means the use of either human tissue samples or derived STR profiles for purposes other than that of comparison with other records on the database. The FSS have undertaken two research projects using genetic samples: both relate to the possible identification of ethnic and familial traits in DNA (we asses these developments in Chapter Seven). In order to carry out such research the FSS were required to submit applications to the National DNA Database board for consideration. Since 1995 the FSS have submitted five applications for research, of which the two already mentioned were approved, and both studies utilized samples in their possession. In March 2004, the Secretary of State for the Home Department answered a Parliamentary question regarding 'informed consent' in this research:

> Neither of the research projects approved by the National DNA Database Board using database records, or the DNA samples collected for the database, have sought the informed consent of participants (Hansard, Written Answers, 17 March 2004).

The lack of obtained consent raises important questions about the use of genetic samples for research purposes. The research is certainly capable of contributing to the 'prevention and detection of crime' and in this sense is an appropriate use of the NDNAD. However, the use of bodily samples that were not donated and where no agreement was given for research uses raises ethical questions regarding genetic privacy. Since tissue samples could be used to expand the range of genetic markers currently analyzed to enable inferences about, for example, physical appearance, The unpredictable nature of future research agendas, combined with the essentially open-ended legislative framework which could justify it, is, for some, another important reason why the police should be required to destroy, or relinquish ownership of, human tissue samples.

However, it is not only tissue samples which could cause concern in the future. Because of recent developments in amplification technology it is possible to sequence the entire genome from trace material and to indefinitely expand it. Such a

'replication' is no longer the original tissue, or DNA from the original tissue, but nevertheless faithfully reproduces the genetic composition of the donor individual. Since retention of the original sample would not be required to allow continued analysis of amplified material a number of issues are raised about what types of material can attract the right of ownership. Similarly, STR profiles, which we have indicated elsewhere in this report, can be used to make inferences about populations which, whilst not always directly relevant to the police, still raise issues about privacy and consent. The retention of samples is irrelevant to the continued use of such profiles.

6.5 Current ethical disputes about the NDNAD

The main current contention regarding the NDNAD is the practice of retaining, and continuously speculatively searching, the DNA profiles of those *not convicted or charged with a recordable offence*. The main issue is not, as described above, about the taking of samples but about the particular practice of databasing profiles of innocent individuals subsequent to the outcome of any investigation or prosecution. Simon Hughes describes what he sees as the undesirable outcome of this arrangement:

> The Government concede that people who have always been innocent and who have never been in the hands of the police should not lose their right to resist having their body samples, fingerprints or DNA samples taken and held without their authority. That puts in a different category from the rest of us people who happen by accident of life to pass through police hands on the basis of suspicion, but are found to be not guilty, and who should be presumed to be as innocent as someone who has not been investigated. That is an entirely improper and prejudicial differentiation that for the rest of their lives will give those people a status with the authorities that disadvantages them in terms of their freedom and liberty (House of commons, Standing Committee F, 8th March 2001).

It is this differentiation, between those who are innocent and those who are convicted, blurred by the inclusion on the database of one-time suspects, which is central to the ongoing challenge in *Marper & S* (2002a & 2002b).

Marper & S exemplifies the dispute over the proportionality of the extension of police powers under the CJPA. The case has been heard three times: first in the High Court,

then in the Court of Appeal under the Lord Chief Justice in September 2002, and most recently by the House of Lords Appellate Committee in June 2004. The background to *Marper & S* lies in two cases in which both individuals, one a twelve year old boy, were denied their request to have their fingerprints and samples destroyed after they were cleared of criminal charges. One aspect of the appellants' case has been the contention that the involuntary retention and use of their DNA discriminates against them and contravenes their right to equal treatment under article 14 of the ECHR. Article 14 is used to demonstrate the illegitimacy of the distinction between innocent persons which is described above by Hughes. The Court of Appeal dismissed this use of Article 14:

> In the eye of the law, everybody is innocent save those who have been lawfully convicted […] But from a policing and law enforcement point of view the unconvicted population is not uniformly beyond suspicion: it cannot be if policing is to function properly, for detection ordinarily begins not with proof but with inquiry […] Not all unconvicted people, in other words, are equal from a policing point of view, even though they are from a legal one; and amongst those who have been charged but not convicted it is especially so. […] There is of course nothing which says that those who have never been suspected of anything will not offend, nor that those who have already fallen under justified suspicion but have been acquitted will go on to offend; but the courts know well that among the latter is a significant proportion – markedly higher than in the unconvicted population at large – who will offend in the future (*R v Marper & S,* 2002b).

The Court of Appeal ruling, upheld by the House of Lords (*R v Marper & S,* 2004), can be seen to reflect the Government's own argument for the legitimacy of extending police powers to retain DNA from those arrested or charged but not convicted. It is an argument which relies on a set of judgements about the moral character of persons who come into contact with the police but who are not proved to have committed any crime. Whereas Simon Hughes describes such people as coming into the hands of the police 'by accident' the Government persistently paint a different picture in which such individuals may be offenders who have escaped conviction on one occasion and may, unless forensic science can be used proactively against them, escape detection in the future.

The most severe criticisms of this view were made during the debates about the *Criminal Justice Bill* in 2003 when it was criticised in the House of Lords both as an attack on civil liberties and a basis for discrimination:

> The Lord Bishop of Worcester: [T]he [Criminal Justice] Bill divides humankind into three – the guilty who have been convicted of offences, the not guilty, and the probably dodgy. I do not wish to be probably dodgy, and I do not really wish to live in a society in which a substantial body of its citizenry have been marked in some database as being probably dodgy (Hansard, House of Lords, 29th October 2003).

During their reading of the Bill the Lords successfully inserted an amendment which sought to curtail the Government's plans to extend DNA retention. Although the Government successfully passed the Bill in the form they had intended the Lords expressed significant opposition to it:

> Lord Dholakia: We do not oppose samples being taken to determine whether or not a charge should be made. That is in the interests of the individual if he or she is innocent. We object to the proposal that this should be routine or on a continuous basis, irrespective of a charge being levelled. The whole question relates to infringing the rights and liberties of the individual. We believe it is for the court to determine in each case whether the sample or profile should be retained (Hansard, House of Lords, 29th October 2003).

In defending the extension of powers, Baroness Scotland of Asthal argued:

> The police are already able to retain other information gathered as part of an investigation, such as witness statements and photographs. Samples and fingerprints are really no different from those pieces of information. Furthermore, if the fingerprints and DNA samples are retained, they will be available to the police in the event of that person committing an offence in the future. I repeat: law-abiding citizens have absolutely nothing to fear from their fingerprints or DNA being retained, as they may only be used only for the prevention or detection of crime (Hansard, House of Lords, 29th October 2003).

The assurance that there is 'nothing to fear' from the retention of samples – because they are used only for the purposes of preventing and detecting crime – is a

Government attempt to allay concerns about NDNAD security and confidentiality. Yet this is a different matter to the privacy related criticism that the removal of individual autonomous control over one's bodily samples is unjustified in relation to innocent people. The criticisms levelled against the CJA and the CJPA is that they constitute a disproportionate interference with the right to privacy and, therefore, the purpose of such a breach, however expressed, is unjustified.

The issue of proportionality has most recently been considered by the Joint Committee on Human Rights (JCHR) in their assessment of the Criminal Justice Bill prior to its reading in the Lords. In evaluating the legislation in relation to the original balance in PACE - between police powers and individual liberty, particular the protection of 'bodily integrity and personal autonomy' - the JCHR argued that 'the carefully struck balance' in PACE 'has been steadily shifted in favour of the police', that 'the range of purposes for which samples could be taken has been steadily extended' and that 'safeguards have been progressively relaxed' (2003: 20). This 'shift' in balance in favour of the police caused significant concern for the JCHR in relation to its justification as proportionate under Article 8.2 of the ECHR. The JCHR report argues that the Government's assertions of proportionality are insufficiently justified in relation to the extension of police provisions under the CJA and that they are 'significantly concerned' that the new powers are not in compliance with Article 8.1 of the ECHR.

6.6 Conclusion

The aim of this chapter has been to consider some of the important ethical issues raised by police uses of DNA and to attend to the differing questions raised by a number of distinct practices. We have been concerned to provide a comprehensive consideration of a number of issues which, whilst occasionally addressed in general debates about the NDNAD, remain relatively unattended to in the UK. Ethical questions about bodily and informational privacy, the powers afforded to the police to take and retain samples, and the character of the data contained on the NDNAD needs to be informed by an understanding of the routine and mundane use of this forensic instrument. These questions also need to be framed in terms of the important 'balance' between individual rights and civil security. What we hope to have shown is that the establishment of this balance raises different questions for distinct aspects of DNA profiling and databasing. As we have argued, these questions are likely to become more urgent as we come to see the increased storage and speculative

searching of the DNA of individuals who have never been charged with, let alone convicted of, a recordable offence.

Chapter Seven

Futures

7.1 Introduction

This chapter of the report considers a range of possible developments which may significantly alter both the future form and police uses of the NDNAD. We deal here with a number of potential technological, organisational and legislative changes which, if realized, would raise significant issues for the NDNAD in terms both of its investigative usefulness and its ethical and social viability as a permanent collection of genetic material. Whilst this chapter is necessarily speculative in character, our analysis is informed by existing discussions already well underway among a broad community of stakeholders concerned with forensic DNA profiling and databasing, and which are often summarised in published accounts in the UK and elsewhere (see for example the *DNA Five Year Programme* of the US National Institute of Justice (1999) and in England & Wales the Home Office (2003b) *Police Science & Technology Strategy 2003-2008*). Our aim here is to outline the most important potential developments in several areas of forensic DNA collection, analysis and databasing and to discuss both the relative advantages and disadvantages of each.

Analysis of current policy trends, scientific and technological research agendas, and emerging investigative applications, suggests that there are three key areas where possible growth in police uses of the NDNAD may occur. The first results from front-end developments where changes in the collection and analysis of DNA at crime scenes may impact upon both the content and interrogation of the database. The second is based on developments in laboratory applications of DNA analysis where technological advances may allow a range of new ways to analyse genetic material. Finally growth may result from possible modifications in the form of the database, from the expansion of its content, or through the extension of its connections with other forensic or non-forensic databases.

7.2 Crime scene collection developments

In this section we consider the possibility of significant changes in the collection, analysis and use of DNA at crime scenes. We focus on two areas: first, the long-standing interest amongst those in the forensic community (particularly the

commercial developers and suppliers of equipment) in designing applications capable of producing DNA profiles at the point of collection; and secondly, the expansion of scene collection through the recent introduction and use of self-administered 'DNA collection kits' by members of the public.

7.2.1 Portability

The Home Office's (2003b) *Police Science & Technology Strategy 2003-2008* commitment to pursue new investigative capabilities through the adaptation of existing technological resources includes the aim of developing 'automated and miniaturised equipment to allow the speedy analysis of DNA and other processes at crime scenes' (Home Office 2003b: 7). Two types of possible technological advances are regularly discussed in relation to this aim: the first is the introduction of a portable device capable of analyzing and profiling a DNA crime scene sample at source – commonly called a 'lab on a chip'; the second is the construction and deployment of a portable laboratory environment for the immediate analysis of crime scene material – a 'lab in a van'. The latter is a more likely immediate development given that a 'lab in a van' could be constructed to contain the required number of devices for the extraction, amplification and profiling of DNA. The 'lab on a chip' is a more speculative idea given the need for further miniaturisation before a device can be supplied capable of being carried from scene to scene by forensic crime scene examiners. Nevertheless, significant advances have been made in technology to enable the eventual successful processing and profiling of DNA in such a way (see, for example, early work at Nanogen Inc. and the Bode Technology Group in the US reported in Ibrahim et al., 1998 and Sosnowski et al, 1997).

The attractiveness of unfettering DNA profiling from the traditional laboratory environment is based on assumptions and predictions of what such portability could achieve. One important feature is the potential for immediate DNA profiling which eliminates the time currently taken for DNA collection, packaging, submission and standard laboratory processing. A common representation is of a small, perhaps hand-held, device which, on the deposit of trace genetic material from a crime scene, produces a DNA profile in a matter of minutes. However realistic that representation is at the present time, the central idea of producing an almost instantaneous crime scene profile remains a much discussed idea. The capacity to produce crime scene profiles in this way also raises issues about how such profiles may be matched with other records since profiles produced at crime scenes are of limited investigative value until they can be speculatively searched against the NDNAD. Therefore, if portability

of profiling is to achieve the promised time savings, comparisons with existing databased profiles would also have to be available at or near the crime scene.

The reduction in time from the collection of evidence at a crime scene to forensic or other intelligence identifying potential suspects is always a desirable and worthwhile gain for the police. A recent Government review of the timeliness of DNA analysis by the FSS has once again been critical of 'excessive delays' and individual police forces are always hoping for more speedy provision of DNA match information. Yet the advantages of developing miniaturised and portable DNA profiling equipment for this purpose remain somewhat limited at the present time in England & Wales. Whilst time could be saved by not having to package and transport samples from crime scenes to laboratories, there are already arrangements in most forensic DNA laboratories for the fast processing of high-priority cases (for example the FSS offers a 'premium' service in which profiles are generated within the shortest time possible, under current technological capabilities, and intelligence reports issued immediately to the police – this is currently offered as a two day service). Whilst there are circumstances in which enhanced investigative efficiency could be gained from further reductions in analysis time at a crime scene, most investigators (and other commentators) place greater emphasis on the reduction of standard waiting times and costs in laboratories.

Savings in analysis time gained by profiling at crime scenes may also be significantly outweighed by the potential problems surrounding this practice. The potential 'lab in van' raises a number of processing issues which, if overlooked at the crime scene, could compromise the scientific validity of any analysis carried out: the potential for contamination of samples will be increased if tests are conducted outside a traditional laboratory environment; additional training will be required to develop appropriate expertise amongst police force personnel for the operation of equipment and the analysis of genetic data; and in many cases the sample may require additional, and more complicated, preparatory work that could only be undertaken in a fully equipped laboratory. 'Lab on a chip' technology may displace some of these traditional laboratory concerns by altering the process of analysis but there would still be pre-processing contamination concerns. There are also significant questions about the evidential consequences of such practices and their subsequent effect on possible prosecutions. Whilst any crime scene analysis carried out in this way would be for intelligence purposes only, and subsequent DNA profiling would be undertaken for evidential use during trial, potential issues could still arise in court regarding the scientific credibility and validity of the original scene stain profiling.

Further to these potential disadvantages would be the problems associated with allowing direct access to the NDNAD by a range of staff employed by local police forces. Under current arrangements access to the database is limited to specific individuals employed by the Custodian. Police officers have no right of access to the database but make requests for information held on it. Allowing access to speculatively search the NDNAD from locations external to the Custodian's premises would raise significant issues about the security and integrity of the database which may raise further concerns about the confidentiality of 'personal' information stored on the NDNAD. Whilst remote access to databases is a routine aspect of police work – for instance, vehicle registration registers which are accessed by police patrol cars – the perceived sensitive nature of the data held on the NDNAD makes the proposition of remote access ethically challenging. Making this large collection of genetic data directly available to police and crime scene personnel, even with maximum IT safeguards in place, may compromise current privacy-related arrangements for the storage and searching of such data and could weaken public support for, and trust in, the database.

It is likely, however, that we will see an emphasis on the development of miniaturized DNA analysis technology across a range of sites and not only in relation to forensic work. The ability to immediately analyze DNA at any location would make it a suitable and attractive biometric for use in a range of security and diagnostic contexts. Furthermore, there may be increasing calls for this biometric potential to be integrated with existing technological platforms, such as smart cards, to enable DNA to be exploited for purposes of routine and daily identification.

7.2.2 Expansion of crime scene collection

In 2003 a number of stories appeared in the media regarding the issuing of DNA collection kits to London Underground workers in an attempt to aid the collection of evidence in cases where staff had been subject to assaults by spitting. British Transport Police confirmed that they were in the process of issuing 'spit kits' (consisting of two swabs, latex gloves, and a sealed bag in which to place the swabs once spittle had been collected). The idea of self-administered DNA collection is not confined to this particular use and the FSS have themselves developed and issued to police forces an 'early collection rape kit' designed for the swabbing of semen at the earliest possible time after a sexual attack. The central idea informing this method of

collection is that it encourages the victim of an assault to collect potentially valuable evidence for later profiling in a forensic laboratory.

In terms of the 'spit kits' the current situation remains somewhat ambiguous. In September 2003 the *BBC* and *The Telegraph* reported that the kits would be introduced on First Buses in the west of Scotland and on Central Trains in England. The swabs taken by First Bus drivers, after a spitting offence, would be sent to Strathclyde Police for analysis and subsequent searching on the database in Dundee (if unmatched the profiles would be sent to the NDNAD). The swabs taken by the staff on Central Trains would be collected by the British Transport Police and passed to their designated DNA analysis laboratory for profiling and subsequent comparison on the NDNAD. Evidence regarding the outcome or effect of the use of these kits is sparse. British Transport Police contend that the pilot scheme in Scotland was successful and, after the collection of 29 samples by staff, resulted in 11 arrests. British Transport Police also state that the use of spit kits on Central Trains is still being piloted and that further schemes are underway on Merseyrail and all Underground stations in central London. In March 2004 the Secretary of State for Transport, answering a Parliamentary question about the protocols for using spit kits on another bus company, Metroline (which operates in the Brent area), indicated that the scheme was about to be piloted and that protocols were currently being established and under review (Hansard, written answers for 5th March 2004).

'Spit kits' are therefore now being used in a number of areas of the UK by front line employees who are subject to harassment involving spitting. Spitting itself is characterized ambiguously in law; it is not a recordable offence *per se* but an individual can be reported for it and subsequently subject to a court summons. Spitting directly at someone can be considered an offence under public order legislation giving grounds for an arrest by the police. Under these circumstances the advantages of 'spit kit' DNA collection are clear given that the swab can be obtained immediately following an attack and, because it is self-administered, involves substantially lower costs than those entailed in dispatching crime scene personnel. Furthermore, the implications for the databasing of suspect profiles might be especially attractive for investigators since there will inevitably be an increased amount of DNA collection from a 'new' pool of individuals. The samples which are collected from this pool can be added to the database and either be used to identify a suspect following a successful hit or, if no match is made, remain available for speculative searching in the future.

There are, however, some serious issues raised by this method of collecting DNA for analysis. First, the quality of the sample is called into question by both the material collected (saliva is not guaranteed to produce a full or even partial DNA profile, given the variance of tissue that will be found in it) and the method of collection (non-trained collection may result in possible contamination of the saliva by material already present on clothing or inadvertently introduced from elsewhere). Perhaps more important are the evidential issues which arise from the use of this material. Even if used only for intelligence purposes the evidential value of DNA profiles obtained in this way is compromised not only by its scientific viability or credibility but by the fact that the swab was taken under conditions where there may be limited corroborating evidence. If presented in court this evidence may be contested on a number of grounds, most notably that the DNA was present for reasons other than spitting.

There are also ethical issues raised by the collection and databasing of material in this way. At present there are no restrictions on the collection of such material and its analysis by DNA profiling, but the introduction of the Human Tissue Bill (2003) seeks to prohibit the collection and storage of human tissue without the consent of the owner except under exceptional circumstances. All collection and use of human tissue for criminal justice purposes would be exempt from such restrictions: the Bill states that these restrictions would be applicable for the purposes of 'establishing by whom, for what purpose, by what means and generally in what circumstances any crime was committed' or to aid 'the apprehension of the person by whom any crime was committed'. However, there remains a considerable distinction between the collection of human tissue samples for criminal justice purposes by designated and trained crime scene personnel and by ordinary members of the public.

7.2.3 Developments in intelligence-led screening

Intelligence-led (mass) screening is used by the police in investigations of serious crime where crime scene profiles fail to be matched with individual profiles on the database. Intelligence led screening has proved to be successful in a number of cases in England & Wales and affords the police a powerful investigative tool. However, as we discussed in Chapter 2 of this report, the NDNAD was itself conceptualized in the late 1980s as a method of avoiding the often costly and time consuming process of screening in this way. Whilst there are circumstances in which intelligence-led screening provides a useful resource to the police it is also recognised by investigators

as being a limited instrument of detection. The strength of intelligence-led screening depends on the ability of investigators to define and target a restricted population of discrete individuals. This method allows for the collection of DNA from a population of individuals who may be dispersed across a large geographical area but who share particular 'suspect' characteristics. Currently these characteristics are derived from various kinds of scientific, witness and inferential intelligence but in the future it may be possible for identifiers to be obtained from the analysis of the crime scene DNA sample itself. This potential development, to exploit crime scene DNA for the identification of phenotypical characteristics, would provide a useful source of information for the design of an intelligence led screen.

One of the concerns that may be raised by the potential increase in intelligence led screening is the retention and further use of individual samples and profiles on the NDNAD. As we discussed in the previous chapter the inclusion of volunteered DNA profiles on the NDNAD for indefinite speculative searching raises several particular ethical concerns. In Scotland plans to create a voluntary database have involved discussions about the viability of a partitioned database which ensures that voluntary samples are not speculatively searched (an idea which was mooted in England & Wales but eventually discarded). It is possible that the arrangements for databasing samples and profiles obtained from volunteers may be subject to greater scrutiny under the new governance and Custodian arrangements for the NDNAD since it is the retention of these genetic data, along with material derived from innocent individuals, which attracts the greatest concern from human rights groups and organizations such as the HGC. Therefore, any increased collection, analysis and retention of DNA from such voluntarily given samples will inevitably attract scrutiny from those concerned with the social and ethical viability of the NDNAD.

7.3 Analytical developments

In this section we consider the potential for further development and application of several key analytical processes which are now already underway. Some of these research developments have arisen from pioneering work aimed at exploiting genetic information held on the database in order to provide new ways of aiding criminal investigations. Some have been developed through FSS research while other developments in laboratory techniques have been achieved beyond the forensic context but may have implications for it.

7.3.1 Familial searching

An important recent development by the FSS Forensic Intelligence Bureau has been a system for searching the NDNAD to identify possible relatives of criminal suspects. The procedure has been applied when a full DNA profile obtained from a crime scene has not matched an existing profile on the database. Familial searching to identify databased relatives of an unknown offender utilizes the increased likelihood of similarity between the DNA profiles of those who have a direct genetic relationship in order to identify a parent, child or sibling of an individual whose profile is available for searching. Familial searching therefore refers not to the *social* arrangement of families but the genetic relationships between individuals – a distinction which is important for investigative as well as ethical reasons.

The use of familial searching in England & Wales has, thus far, remained limited and at the current time its application remains novel; the FSS report running approximately 20 familial searches where a quarter have yielded useful intelligence information. The reasons for this limited application are: the novelty of the process; the recognition by the police of a number of ethical issues which arise from its use; and the volume of partial matches it may provide. Because familial searching relies on identifying a pool of possible genetic relatives of a suspect, who are then subject to more direct investigation (typically by being interviewed by the police), ACPO has acknowledged that a number of ethical issues need to be addressed. The *National DNA Database Annual Report 2002-03* states that the 'Database Board has recently sought advice from the Information Commissioner on the ethics and data protection issues of using this new approach more widely and will be issuing guidelines in the near future' (Forensic Science Service 2003: 25). As yet no publicly available guidelines have been issued but it is important to note that ACPO suspended the use of familial searching for a short time in anticipation of ethical misgivings by relevant authorities including the HGC.

There are several fundamental problems. A genetic link between individuals might be previously unknown by one or both parties and police investigations may make such information known to them for the first time (and, as a by product, may reveal the absence of genetic links which participants assumed to have existed – estimates of the non-paternity rate in the UK vary between 5 and 20%). There is also the question of whether the use of an individual's databased DNA in this way violates existing promises of privacy and confidentiality made when genetic material was originally collected. Furthermore, the implicit assumptions made about criminality and

relatedness may also be problematic. For instance the Custodian of the database recently outlined in a public meeting of the HGC: '[Familial searching] is based on some very important assumptions that criminality can run in families, that a relative could be on the database, the families tend to live in the same area, and that offenders tend to offend close to their homes or in areas that they frequently visit' (London Meeting, February 2004). There are pervasive problems associated with confusion between 'genetic' and 'social' relatedness ('families' are not only constituted through genetic lines but through clusters of non-genetically related individuals) and with the implicit idea that criminality is fostered because of such relatedness (either because of genetic or social reasons). It is likely that these issues will be widely discussed in the near future when, given the investigative potential of this process, it is more widely exploited by the police.

However, despite these issues, the initial application of familial searching does show that it can be effective. Its first use by the FSS in 2002 compared a full DNA profile, obtained using Low Copy Number analysis, from crime scene stains taken from three women murdered in South Wales in 1973. The resulting profile was used to make a familial match on the NDNAD to Paul Kappen which in turn led to the detection of his father, Joseph Kappen, as the rapist and murderer of each of the women. The case shows that familial searching can be suitable when deployed alongside a number of other investigative techniques. In the Kappen case familial searching was used only after a prior intelligence-led screen, combined with psychological profiling, targeted 500 potential suspects (a process formulated and undertaken 27 years after the original murders). During the intelligence-led screening of these 500 suspects the police had attempted to visit and take DNA from Joseph Kappen, a suspect on the list, but learned from his wife that he had died some years before their new enquiries had begun. When the subsequent familial search of the NDNAD produced Paul Kappen's name as a possible close relative of the person who had left their DNA at the earlier crime scenes, the police re-visited the Kappen family to take samples from Paul Kappen's mother and his siblings. Inferences made from the analysis of these additional DNA profiles were sufficiently credible for the police to be given permission to exhume Jospeh Kappen's body and subsequently confirm a full match between him and all three crime scenes. It was on the basis of this match that the case was closed. The case shows the highly significant use of familial searching but also the potential problems – investigative as well as ethical – in producing a large pool of potential relatives of a suspect whose guilt may not always be corroborated (as it was in the Kappen case) by other intelligence information.

The other significant 'cold case' in which familial searching has been successfully deployed, in the investigation and subsequent detection of Jeffrey Gafoor for the 1988 murder of Lynette White, shows that the composition of the crime scene DNA profile produces variability in the effectiveness of this process. A full profile obtained from the crime scene where White was murdered contained an allele variant found in only 1-2% of those on the NDNAD. By increasing the amount of loci searched (to discriminate further within that 1-2%), and geographically screening the results, the NDNAD produced a smaller pool of 70 potential relatives of the person who left the crime scene stain. During the investigation of that pool the identification of one potential relative, a 14 year old boy, prompted the further screening of a family which led to the identification of Jeffrey Gafoor as the murderer.

A recent use of familial searching, during an investigation following the death of Michael Little (who suffered fatal injuries after a brick was thrown through the windscreen of his moving vehicle), has delivered the first detection leading to a successful criminal prosecution in a current police case. Craig Harman admitted to the manslaughter of Little after being linked to the crime scene via the identification (and subsequent investigation) of a close relative on the NDNAD. Crime scene DNA, obtained from the brick thrown through Little's windscreen (the DNA was present in blood found on the brick, deposited there as the result of a wound sustained during an earlier attempt to steal a car), yielded a full DNA profile that did not match any profile on the NDNAD. An intelligence-led screen was undertaken which produced no match. The use of familial searching identified a close relative of Harman on the database which directed the investigation led by Surrey police. Harman received a six year prison sentence. This case, along with the others detailed above, is likely to be central in future advocacy of the potential for familial searching in police investigations.

7.3.2 Partial profile searching

At 31st March 2003 there were 22,849 'partial profiles' derived from crime scene samples on the database, where degradation of the DNA or the collection of insufficient quantity of DNA made the production of a full profile impossible. Each of these partial profiles was made up of genotypes from at least four loci and will be automatically searched against newly loaded CJ and crime scene profiles. In cases of serious crime, crime scene profiles made up of less than four loci may also be speculatively searched against existing profiles but cannot themselves be loaded onto

the database. In 2002/2003, 1,394 speculative searches of this latter type were carried out. Both automatic and one-off speculative searches of partial profiles result in varying numbers of matches, some of which may be subject to further laboratory investigation, but all of which may provide useful corroborative or eliminative intelligence to investigators.

The expanding use of Low Copy Number DNA technology on degraded or otherwise unproductive samples is likely to produce a greater volume of such partial profiles. There are particular problems associated with the use of this technology, in particular that profiles may be derived from extremely small traces – as little as a single cell – which may have no connection to the crime under investigation. Therefore, investigators may increasingly need assistance in the interpretation of the significance of matches derived from these partial profiles if they are to be deployed in on-going investigations. Some police forces have studied the effective integration of DNA with other forms of forensic identification in order to narrow a pool of suspects before employing other investigative resources, but these prototypes remain unpublished at the present time. It is likely that forces will continue to develop their uses of these data in the attempt to identify suspects who may be subject to further attention. It remains uncertain what view would be taken by courts when matches between individual profiles and partial crime scene profiles are presented as evidence in support of a prosecution.

7.3.3 Suspect characteristics from DNA

Two different kinds of techniques are currently used to analyse DNA samples and profiles in order to make a limited number of inferences about the phenotypical characteristics of individuals who have been profiled. The first kind involves additional analysis of the genetic material to that normally undertaken for STR profile construction. An example of such analysis is the ‘red hair test’ offered by the FSS which is based on the identification of differences in individuals’ DNA within the specific gene that is known to determine hair pigmentation. The second kind involves the further analysis of the alleles determined by forensic STR profiling to infer aspects of the individual’s ‘genetic ancestral origins’, and thus some aspects of their likely physical appearance. Once again the FSS offers a service of this kind, described as an ‘ethnic inference service’, using computer software ALFIE (allele frequency for the inference of ethnicity) to predict the ethnicity of an individual by comparing differences identified (by the FSS) to exist between five 'ethnic groups'. These services are sporadically utilized by the police to provide intelligence about the physical

appearance of individuals when a crime scene stain has been obtained for an unknown suspect.

The two services currently offered by the FSS are designed to be used in relation to other intelligence gathering methods such as intelligence-led screens. They can be used to aid the police to define a target population of suspects. There is insufficient publicly available evidence to allow an evaluation of the effectiveness of these services. However it is acknowledged that there are difficulties in using genetic inferences to predict physical characteristics which are themselves alterable by individuals (e.g. through the dyeing of hair and the use of coloured contact lenses). The FSS is currently developing further systems that are asserted to predict physical characteristics such as eye and skin colour along with facial structures from an analysis of DNA. In the USA such technologies are already being marketed: DNAPrint Genomics have developed a system, *DNA Witness 2.0*, which they claim can infer both the ethnicity of an individual and allow for the reconstruction of certain aspects of appearance.

Some problems arise from the current application of these forms of analysis for the investigation and detection of crime. The estimation of ethnicity by the FSS raises several important issues about the methodological basis used to make such inferences. In particular the FSS tend to use the terms 'race' and 'ethnicity' interchangeably (see the fact sheet 'Commonplace characteristics', September 2002) and this allows a potential confusion between genetic ancestral origin (what may be referred to in some contexts as race) and the socially available categories of ethnicity which are culturally defined, although often attached to skin colour (such as 'White European' or 'Black Afro-Caribbean').

Regardless of the methodological or scientific basis of these technologies it seems certain that the development of systems for discerning individual characteristics from crime scene DNA will continue to be pursued and developed. The *Police Science and Technology Strategy 2003-2008* (Home Office, 2003b) makes a commitment to develop ways to 'predict physical characteristics' from DNA. This is not surprising since there are some obvious advantages for criminal investigators in being able to define and refine a target population of suspects for any particular crime or series of crimes. Yet the current state of the technology gives no indication that it is likely to develop quickly. The ethnic inference service offered by the FSS can provide statistical calculations of 'race' based on the likelihood of certain alleles present in a DNA

profile. Therefore, it will provide only a statistical probability of someone having a specific genetic ancestry or belonging to a particular 'race'. The practical value of such an inference remains largely unknown, and in any case depends on the precise circumstances of any crime under investigation. Despite the claims of some potential suppliers of these kinds of genetic intelligence, the extent to which police investigations are directed on the basis of such inferences is currently dictated by the limited scientific credibility and pragmatic utility attributed to these resources.

A number of ethical issues may arise from research and development of technologies designed to interrogate human tissue samples in this way. Any information about an individual which the police derive from samples could be seemed sensitive and personal. For example, seeking to analyze genetic variants that contribute to facial composition could reveal medical information about a range of congenital disorders relating to both the individual and their family. The capacity to discover medical information could also raise ethical issues for the police regarding the disclosure of such information to both the individual concerned and their genetic relations. Current routine use of a sex marker in sample analysis already raises a similar issue since it reveals an individual's chromosomal gender rather than the gender identity which is performed by the person.

Nevertheless, these procedures, along with a range of other promissory technologies, will continue to be developed for the purpose of analyzing crime scene DNA. Haplotype mapping promises to discern new types of 'personal' information about the genetic ancestry of individuals from an analysis of their DNA. One such technology, recently patented in the USA by Bryan Sykes of Isis Innovation Limited UK, claims to be able to discern male surnames from an analysis of Y chromosome haplotypes. Combining forensic analysis with forms of genealogical research will certainly be on the agenda for future research. Yet it remains to be seen how effective these types of analysis will prove and what their investigative potential might be.

7.3.4 Platform alteration

Whilst there are some differences in the profiles contained on the NDNAD, resulting from incremental changes in the technology used to produce them, all NDNAD profiles have been produced using Short Tandem Repeat (STR) analysis, a method common to most forensic databases across Europe and the rest of the world. However, the recent development of another platform for producing individual profiles, using Single Nucleotide Polymorphisms (SNPs), has raised questions about its

possible future uses for forensic databasing in the UK and elsewhere. The potential benefits which SNP technology may offer have prompted a debate in the UK about a possible platform alteration for the NDNAD.

SNP technology boasts a number of attractive features for those undertaking DNA profiling. In particular it would greatly facilitate the derivation of suspect characteristics described in the previous section. It can also be used to derive profiles from much more degraded samples because it requires shorter strands of DNA. Although each SNP is less discriminating than a single STR locus analysis, a large number of SNPs can be analysed at low cost. This then offers the potential to produce highly discriminating profiles using a greater number of loci. The technology itself is not new but recent developments have prompted speculation that its current form may supersede STR profiling in the future. A recent article by Gill and Werrett *et al* (2004), of the FSS, suggests that, whilst SNP analysis is useful for a number of purposes (they suggest that it is highly appropriate for use in mass disaster analysis where human remains yield extremely degraded samples) it would not be scientifically beneficial to upgrade the NDNAD to SNP profiles since, in standard sample analysis, the gains would be limited. Furthermore, as we discuss in the next section, the potential for data-sharing and exchange of DNA profiles across national jurisdictions means that platform alteration in the UK would severely limit cross-national comparison.

At present the main reason which makes platform alteration unlikely, is the cost involved in upgrading the 2 million DNA samples already held on the database. The scale of resources needed to process such a high backlog of samples makes changing the NDNAD to a database based on a SNP collection highly unlikely in the near or medium term future. However, SNP genotyping is becoming a highly standardised technology in the biotechnology industry and is being embedded in a number of powerful emerging technologies, most notably DNA microarrays or so called 'gene chips'. The cost of these chips is expected to fall rapidly in the medium term and the availability of a cheap SNP-based platform in the long term cannot be dismissed. If it could be demonstrated that a change in the technology platform could deliver significantly improved intelligence from a crime scene stain, this might provide impetus for change. At the very least, the suitability of SNP typing platforms for miniaturized profiling devices may mean that it will develop in parallel with STR typing systems.

7.4 Database developments

The current composition of the NDNAD reflects the legislative framework intended to capture the DNA profiles of a specific population: the 'active criminal population'. The recent extension of police powers to sample, retain, and indefinitely speculatively search DNA from all arrestees, along with a systematic exercise of 'mopping up' those already in custody, means that the NDNAD is an increasingly comprehensive collection of all those profiles that may lawfully be colleted and retained. Under the current remit of targeting the 'active criminal population' there is therefore little scope for the further expansion of the NDNAD by the inclusion of samples from any other category of individuals. It seems unlikely that the government would extend the power of the police to take non-intimate samples without consent for non-recordable offences or from individuals before the point of arrest (although it is possible that the category of recordable offences could be widened). Whilst the possibility of a universal, population database is often discussed, a DNA register of all citizens is not a current Government commitment. This means that immediate further developments in the use of the database will now focus, not on expanding the collection beyond its current parameters, but on exploiting its existing scope further and more effectively. There are various plans already in place to encourage and facilitate greater use of the NDNAD by disseminating 'good practice' in its use amongst the 43 police forces who currently submit tissue samples and receive DNA intelligence in return, and by combining it with other intelligence sources, both here and abroad, through various forms of data-sharing.

7.4.1 Data-sharing and exchange

The NDNAD is an intelligence resource currently used by the police in support of various aspects of criminal investigations. The database has become an integral aspect of policing which is often utilized in tandem with other forensic methods (most commonly, fingerprinting). Current policy and policing ambitions for the NDNAD see great potential in linking it to other intelligence sources. There are three key ways in which this potential could be exploited. The first would be through more efficient 'joined-up' police record keeping; the second would involve co-joining the NDNAD to DNA databases in other jurisdictions to create either European or global coverage; the third possibility would be to create mechanisms for data access to, and possible exchange with, non-forensic DNA databases.

The first possibility is already an explicit aim of both Government and the police. The publication of the *Police Science & Technology Strategy 2003-2008* (Home Office,

2003b) demonstrates the Home Office ambition to consolidate all existing, and potentially new, scientific instruments into an overall scheme to maximize the efficiency and effectiveness of investigations. The driving force of this ambition is to use more effective systems of data-sharing to enable more sophisticated intelligence gathering and use during an investigation. The issue here is not the enhanced collection of DNA samples from individual crime scenes but the joining up of intelligence information within forces to aid criminal detection. The ambition is two-fold: first, to systematically tie the full spectrum of intelligence material together so that it can be cross-referenced and checked; and second, to tie all forms of intelligence to the individual to whom it relates. The emphasis is therefore not on the gathering of intelligence but on the arrangements for storing and analyzing data once they are captured.

Perhaps the most widely discussed (and publicly contentious) idea for achieving this is through the introduction of ID or 'entitlement' cards. It seems likely that any ID card introduced into the UK will contain a biometric that can be used to prevent fraud and verify identity (Home Office, 2002). An ID card scheme would function by providing a reference point to which a range of information would be tied. The effectiveness of the scheme would depend on a card's ability to capture individuality by means of a reliable and unique biometric identifier (i.e. a biological characteristic unique to that individual). Since DNA is the only biometric which is universal to all human beings it is extremely valuable for this purpose. However, the problems associated with obtaining, analyzing, and verifying DNA make it unsuitable for inclusion on an ID card (fingerprints, used in relation to new Livescan technology, provide an almost instant method of ID verification). However, whilst it is unlikely in the short term that DNA will be used directly on ID cards, direct or indirect links to the NDNAD will play an important role in the intelligence systems developed in conjunction with this scheme.

Increasing the capacity for the police to locate and identify individuals will drive ambitions to maximize data-sharing within the 43 police forces of England & Wales. However, there are also ambitions, and some existing measures, to allow forms of data-sharing between forensic databases throughout Europe and the rest of the world. Current local arrangements within the UK highlight the success of data-sharing between England & Wales and Scotland to establish database coverage across the whole of Britain (see, Johnson & Williams, 2004). These arrangements currently allow police forces in each jurisdiction to share information in order that cross-border coverage can be maintained. The advantages in developing similar arrangements

across, at least, Europe and, potentially, the whole globe are obvious in relation to international, cross-border crime: data-sharing is an important aspect of policing in mainland Europe and in all landmasses composed of multiple criminal justice jurisdictions.

The idea of international DNA database harmonization has been embraced by Interpol who have heavily invested in the development and implementation of their own cross-national register of profiles. Members of Interpol can currently submit and search profiles on a limited database (see Interpol, 2001). An Interpol working group (DNA MEG) is actively committed to promoting DNA databases worldwide and the potential for sharing information between them. The long-standing European DNA Profiling Group – formed in 1988 to promote international standards in DNA profiling – reinforced by later involvement of the European Network of Forensic Institutes have pursued an agenda for DNA profile sharing within the boundaries of the European Union. The result of this agenda has been the Council Resolution of the European Union (2001/C 187/01) on the exchange of DNA analysis results between member states (which updates a previous Council resolution of 1997 encouraging the construction of national DNA databases in member states). The Resolution outlines procedures for the exchange of DNA profiles across the European Union by police forces for the purposes of criminal investigations.

A number of technological, legislative, and ethical problems are associated with the exchange of data in this way. The technological problems have been debated since the late 1980s when a divergence of DNA profiling techniques produced remarkably different, and non-compatible, individual profiles. The range of STR profiling methods, analyzing different combinations of loci, currently make datasharing across jurisdictions problematic. Interpol are concerned to implement a minimal universal standard of profiling so that individual profiles can more easily be loaded and searched on a 'global' database. This ambition is far from realized because local differences in profiling are extensive. Nevertheless, there are sufficient and increasing similarities between STR systems across the world to allow data-sharing via Interpol. Discrepancies between national legislation also produce difficulties for data-sharing given that the criteria for obtaining and retaining a DNA profile, and thus making it available for submission to an international DNA database, will differ substantially between nation states.

There are important ethical issues raised by the exchange of data across national boundaries which have not been addressed in any Government consideration of the potential for international DNA sharing or harmonization. These issues relate to the ways in which, under existing arrangements for the exchange of intelligence material (particularly across Europe, subject to the Europol Convention), tensions are created by both domestic and EU legislation designed to ensure data protection and personal privacy. A letter sent to then Minister of State, Barbara Roche, by Lord Tordoff, chairman of the Law and Institutions (Sub-Committee E) of the House of Commons, in response to the drafting of what has subsequently become the European Council resolution on DNA data exchange, states that:

> The committee remains concerned that an instrument whose purpose is to encourage Member States to share DNA data fails to specify minimum standards of protection. Identification of the appropriate data protection standards applicable to such exchanges would seem to be a necessary and an integral part of the instrument.

Whilst DNA profiles can be divulged to those outside England & Wales under exemptions in the Data Protection Act (1998) there has been no specific Government consideration of this issue. Nor have guidelines been issued for the handling and exchange of DNA profiles other than those contained in the general provisions of the EU legislation under which an exchange is authorized (Title VI of the Treaty of the European Union) and the Europol Conventions which frame them (Title IV of the Europol Convention which outlines parameters for the storage and use of personal information).

Given the repeated assertion from Government and the Custodian of the NDNAD that public trust and confidence in the database is fundamental to its existence, the sharing of 'personal' data across national jurisdictions is highly significant. The process of exchanging DNA profiles across national borders means that, inevitably, information deemed 'personal' leaves the jurisdiction in which it was obtained. Concerns have been expressed that when DNA profiles are submitted to police forces abroad there is little data protection legislation to prevent their unauthorized storage and use. Furthermore, there is no oversight body to monitor or assess the exchange of DNA profiles or any organization to make enquiries and possible complaints on behalf of individuals.

There is a third way in which DNA profiling may be subject to police development in the future: that is, through the comparison of crime scene profiles with data held on non-forensic genetic databases. The concern that medical databases may be subject to police access is often raised as a significant threat to personal privacy. Whilst it is rare for police to attempt to access genetic records held by the NHS or other health researchers, there has been at least one significant case where this occurred. The case involved the police gaining access to information derived from samples given voluntarily to a Medical Research Council study of HIV. Confidential information, revealing the HIV status of Stephen Kelly was used to convict him of recklessly passing the virus to his girlfriend, Anne Craig. Police accessed medical records, using a warrant, which established a link between Craig's particular strain of the HIV virus and Kelly's. The case demonstrates the capacity for police to utilize medical evidence in this way and their power to access it. For some this has provided a basis for arguing for greater legal restrictions on such powers and the rights of medical researchers to refuse the police access to information. For others, it suggests the need to include reference to such potential access in initial consent forms.

However, it would be a mistake to over-estimate the usefulness that access of this kind would afford the police during most criminal investigations. Medical databases cannot be speculatively searched in the manner of the NDNAD due to the types of records that constitute them – DNA (STR) profiles are distinct to the NDNAD (although greater use of medical databases could result from the adoption of SNP profiling). Nor would there be any significant advantage in cross-referencing non-forensic databases with the NDNAD. One concern may be the potential for the police to access medical databases to identify an individual with a specific medical characteristic. This could be undertaken to obtain a list of possible suspects who share a medical trait identified from a crime scene sample. The utility use of medical databases for these purposes (which would be permitted by law in England & Wales) is currently reduced by the capacity to analyze crime scene samples and the high volume and costly investigations of large groups of individuals that might be found on databases. Nevertheless, the establishment of UK Biobank, which will contain a large number of genetic samples, raises concerns about the adequacy of data protection and the level of confidentiality for the individuals concerned. UK Biobank has stated that it will allow access to information by the police only where a court-order is presented and under certain circumstances may even seek to resist such an order. Yet the HGC has expressed the view that access to such personal information, in the interests of both the success of

projects such as UK Biobank and the confidentiality of individuals, should be blocked to the police and the courts.

7.4.2 A 'universal' DNA database

Since the NDNAD came into existence in 1995 there has been continual speculation and concern about the possible extension of the collection to cover the entire population. There is no publicly stated Government commitment to construct a universal DNA database and there is no official ACPO interest in having access to the DNA profiles of all individuals. The current emphasis on making the NDNAD a collection of the 'active criminal population' clearly defines the Government's intention to record, in the widest possible way, all those individuals who have been suspected of involvement in a recordable offence. Nevertheless, for those concerned about the potential of a universal DNA database this current situation raises significant issues: for some, the NDNAD presents a worrying trend towards the formation of a universal DNA register. In turn, there are those who argue that the database should be extended to cover the population because, not only would this increase its capacity to ensure parity within the criminal justice system, it would also remove the potentially discriminatory effects created by the current NDNAD.

Worries about the possible trend towards a universal database are regularly expressed by human rights groups, parliamentarians, academics, and other commentators. A central preoccupation is the 'creeping' effect of legislation which year-by-year extends the database by affording the police greater power to take, store, and search DNA profiles and samples. For example, commenting on the specific provision which empowers the police to retain voluntary samples on the NDNAD, Crispen Blunt MP argues:

> I am concerned that an attempt is being made to widen the DNA database by subterfuge, so that people who willingly come forward to take part in a screening process – for example where the police are checking all males in a particular village in which a rape has been committed in order to eliminate people from their inquiries – become part of a subtle and surreptitious attempt to widen the DNA database (House of commons, Standing Committee F, 8th March 2001).

The human rights group, Liberty, has also argued that the Government have widened the database surreptitiously in ways which go beyond the reasonable objective of

preventing and detecting crime. Liberty argues that there must be explicit public debate about the NDNAD and its continuing expansion to cover a significant section of the population. These criticisms represent a critique of the changing 'balance' in the criminal justice system that we discussed in the previous chapter but they also express concern about the potential negative impact on civil liberties of a widened database. The idea of a universal DNA database would, for some, be a greater threat to liberty because of the potential uses (and misuses) to which it could be put. Such concerns are inevitably speculative since the Government's consistent position is that a universal DNA database would not deliver worthwhile gains in the 'fight against crime'.

This position contrasts with that of the Police Superintendents' Association (PSA) which has consistently expressed a desire for the creation of a population-wide database. The PSA most recently argued for a universal database in relation to the investigation and subsequent detection of Antoni Imiela, the so-called M25 rapist, who committed a series of rapes against women and girls. The basis for the PSA's argument is that a database match with the DNA profile obtained from the first of Imiela's victims would have served to identify Imiela as a suspect prior to at least 7 subsequent attacks. Yet in the future, under current arrangements for databasing, persons like Imelia *will* be present on the NDNAD: Imelia had been previously arrested and convicted of violent offences prior to the series of rapes but the timing of his conviction meant he was not present on the NDNAD (his last sentence, of 14 years imprisonment, ended in 1996, prior to the 'mopping up' exercise carried out by the Home Office).

No universal criminal database has ever existed in England & Wales and there would be staunch opposition to any proposal to create one. Yet there are those who argue for the creation of a national and universal DNA register on the basis that it would actually enhance civil liberties rather than damage them. Alec Jeffreys has recently expressed the view that the current composition and structure of the NDNAD is potentially discriminatory given that it contains a collection of samples of innocent people. This issue has been central to *Marper & S* in which the appellants argued that their inclusion on the NDNAD constitutes wrongful discrimination under Articles 8 & 14 of the European Convention on Human Rights. Jeffreys' also argues that the database will contain a significantly disproportionate representation of non-white individuals and be unfairly ethnically balanced (there is no current mechanism for calculating the ethnic composition of the database since the Home Office has stated

that, whilst records of ethnicity are held against each individual profile, specialist software would have to be produced to calculate the percentage breakdown. See: Hansard, 8 Apr 2003).

Jeffreys' view is that the UK should possess a universal DNA register but that this should be separate from the NDNAD. Such a database would contain the DNA profiles of the entire population of the UK and form a register of identity akin to the current arrangments for recording birth, deaths and marriages. This population database would have different governance arrangements to the NDNAD; in particular the police would not have the power to speculatively search this database continuously but would be granted access to it under specified circumstances. However, as we indicated earlier, this combination of increased coverage and restricted access rights seems unlikely to appeal to the current stakeholders in the NDNAD. The cost involved in sampling the population and the ethical issues raised by doing so make it an unattractive proposition at present.

7.5 Conclusion

This chapter has assessed the potential developments in DNA profiling and databasing which may effect the future organization and use of forensic DNA in England & Wales. As we stated above, all of the possible changes which we have discussed are currently on the agendas of at least some of those involved in the provision and application of DNA profiling technologies. Some ideas are more speculative than others: the desire to exploit nanotechnology to enable the immediate profiling of DNA and the use of such a system in smartcard technology is, whilst actively being researched, a long-term goal. Other aspects outlined above, such as the introduction of self-administered testing kits, could become more widespread in the near future. The future use of familial searching will also raise ethical as well as investigative questions and, along with the development of genetic analysis technologies, is likely to be subject to interrogation by bodies such as the HGC and several human rights groups.

One area of development that is assured is the expansion of forms of data-sharing across the member states of the EU. A recent announcement by the Home Secretary at a G5 meeting in Sheffield in July 2004 stated that, whilst there was no plan to construct a European DNA Database, member states will seek to implement platforms to allow the systematic sharing of databased DNA profiles. The administration of this data-sharing will be carried out by Europol, the European Police Office, who are

empowered to obtain and transmit information between member states. Such powers have already received severe criticism from Statewatch and the expansion of Europol's remit is likely to engender further critique.

Chapter Eight

Conclusion and recommendations

8.1 Introduction

The use of the NDNAD to speculatively search all newly acquired DNA profiles against those already obtained from crime scenes, from those suspected of involvement in crime and from some volunteers, has become an invaluable method for the forensic investigation of a wide range of crimes. Each week, between 8,000 and 10,000 CJ profiles and between 1,000 to 1,500 crime scene profiles are loaded onto the database and the Custodian reports a 40% chance of a newly loaded crime scene sample matching an already databased CJ profile. In 2002-2003, DNA profile matches contributed to 21,000 detections. In the same period detection rates in cases where DNA profile matches were available increased to an average of 37%.

The previous chapters of this report have sought to situate this current level of usage within the historical context of the growth of forensic DNA profiling in the UK from the early 1980s to the present day. We have considered the legislative, financial and operational support given to this development, assessed the claims made for the effectiveness of its contribution to crime detection, and outlined some of the important ethical commentaries on the consequences of its continued expansion. We have also detailed the technological and organisational innovations most likely to effect the uses of forensic DNA profiling and databasing in the near-future. In this final chapter we review our earlier commentaries and make a series of recommendations in a number of key areas including: assessments of the effectiveness of the NDNAD; the ethics of the inclusion and retention of DNA profiles from a widening range of individuals; the arrangements for the governance of the database; and the shape and implications of some of the possible developments in its use.

8.2 The Establishment and Expansion of the NDNAD

In Chapter Two of this report we suggested that the combination of the initial investigative success of the early applications of DNA profiling along with its acceptance by the judiciary as capable of being to be presented to juries meant that forensic uses of this technology were established in the England & Wales by the early

1990s. A small number of cases raised problems about the presentation of DNA evidence in criminal trials, but these problems were quickly resolved with the increasing standardisation of laboratory reporting and the establishment of conventions for the statistical presentation and evaluation of DNA matches by expert witnesses in court. These developments provided the foundations of credibility and reliability which enabled the incorporation of DNA profiling into routine police work and were of central importance for the future significance of the NDNAD.

However it is a remarkable fact that no comprehensive review of the robustness of the scientific and technical practices central to the operation of the NDNAD itself has ever been published in the scientific peer reviewed literature. The recent Annual Report on the NDNAD provides some information about the number of 'duplicate samples' held on the database but full details are not supplied to explain these or to distinguish them from spurious matches. Whilst this issue, along with the use of the underlying STR technology to obtain such matches, has never been subject to legal challenge, it is not impossible that such challenges could occur in the future as the size and the inclusiveness of the database grows. It may be that the adequacy of the current STR marker system will become subject to dispute on the grounds that a larger number of markers would be useful greatly to reduce the risk of spurious matches, particularly between close relatives. It has also been argued (for example, by Alec Jeffreys) that 'evidential matches' should be based on the examination of different loci from those used in the NDNAD match so that the second test can be seen to be properly independent of the first. This suggestion is in marked contrast to the current discussion between the Custodian and ACPO of the possibility of abandoning routine second sample profiling and comparison in advance of the requirement to produce evidence for court.

We recommend that there should be an authoritative review of the scientific and technological foundations of the NDNAD which explores the robustness of the current methods used for STR profiling, the adequacy of the current numbers of STR markers in the light of the expanding size of the database, and the nature of the 'duplicate samples' currently known to be held on the database. The review should also consider the scientific case for fully independent re-testing of 'evidential samples' along with the potential effects on public confidence of a move to abandoning the routine second sample testing where evidence is not required to support criminal prosecutions.

As we have argued, the establishment of a national DNA database in England & Wales was not the inevitable outcome of the technical development of DNA profiling nor its application to the criminal justice process. Rather, the NDNAD was created by several centrally directed policy initiatives and subsequent legal changes which reflected the particular interests of a relatively small number of agencies. Prior to its creation there was little reliable evidence of the value of DNA profiling in the routine investigation of crime, especially volume crime. This contrasts with the high expectations of this technology rapidly established amongst politicians and other key acotrs by reference to the known effectiveness of traditional fingerprint techniques in detecting crime committed by repeat offenders. These expectations were in turn mobilised to win the substantial resources necessary for the establishment and expansion of collections of DNA profiles in the form of the NDNAD. The database is now conceived as capturing information and providing surveillance on the so called 'active criminal population' and the most recent legislation has permitted the retention of profiles obtained from those arrested in connection with any recordable offence regardless of subsequent disposition. The retention of profiles derived from the non-consensual sampling of individuals who have not been convicted of any criminal offence is a significant expansion which may affect the public understanding of police uses of the NDNAD.

We recommend that future policy discussions of the further expansion and developing uses of the NDNAD should involve wider political and public debate to ensure continuing support for its legitimate operation.

8.3 The effectiveness of the NDNAD

The expansion of the NDNAD has been accompanied by political demands that the police maximise the efficiency, investigative-effectiveness and cost-effectiveness of their use of this forensic resource. These demands have led to greater standardisation in police uses of DNA profiling as well as the development of a large number of indicators to facilitate detailed comparison of the relative performance of different forces. However, the poor quality of data provided by many forces has severely limited attempts to rigorously evaluate the overall benefits of this technology. Whilst it remains difficult to estimate the contribution of the NDNAD to the larger aim of increasing the proportion of crimes detected (and therefore its impact on crime reduction), most of the available data suggest that the performance of many forces has routinely fallen short of the high expectations used to justify the massive expansion of the NDNAD. There remain no publicly available independent evaluations of the NDNAD almost ten years after its establishment.

We recommend that more priority and resources should be given to an independent evaluation of the effectiveness of police uses of the NDNAD for detecting crime. The widespread public dissemination of such an evaluation is important since continued support for its operation will depend on a clear demonstration that the erosion of civil liberties involved in expanded forensic DNA databasing can be justified by corresponding improvements in public security.

8.4 The governance of the NDNAD

The existence the NDNAD rests on no single statutory instrument and the activities of the database custodian are largely governed by a *Memorandum of Understanding* between the 43 Police Forces of England and Wales and the FSS. This memorandum provides the overall regulatory framework for the database and includes the setting and monitoring of a number of relevant scientific standards as well as ensuring the legitimacy of the ways in which information in the database is disseminated and used. Juridico-scientific accountability of the legitimate uses of DNA for operational purposes is clearly defined by legislation. There are additional statutory safeguards that govern standard setting, laboratory quality assurance, data handling and protection, and database security. Similarly, the administrative accountability of the NDNAD is clearly defined through the practices of the custodian and the working on the MOU, with an emphasis on monitoring the efficiency of its routine operation and the effectiveness of its uses by individual police forces.

In contrast, the civic accountability of the NDNAD is much more poorly defined. Most of the actors involved in the operation and use of the database are concerned with juridico-scientific and administrative forms of accountability but until recently have paid little attention to broader questions concerning the ethical and social propriety of this large body of genetic information and the uses to which it is put. However, key groups such as ACPO are increasingly recognising the potential sensitivities that surround the collection and retention of DNA profiles and samples. Proposed changes in the organisation of the FSS have implications for the custodianship of the NDNAD and the necessity for new forms of public accountability. These include suggestions for the creation of an independent body with lay members to monitor the workings of the database. The realization of such proposals would both enable greater scrutiny of the management, use and future development of this key resource, and also increase

current levels of openness and transparency where they do not comprise legitimate operational interests.

We recommend the creation of an independent oversight body with lay members to scrutinise the workings of the NDNAD. This would monitor the management, use and future development of this key forensic resource, as well as promote openness and transparency in accordance with the principles underpinning the Freedom of Information Act (2000) which comes into force in January 2005.

An important subsidiary area of the NDNAD is the conduct of genetic research carried out by the Custodian or any of the laboratories who are storing samples from which genetic profiles have been obtained. Such research activities are especially in need of improved governance arrangements. Research findings will play a key role in shaping the future trajectory of the NDNAD and should therefore be the subject of greater scientific and public scrutiny.

We recommend the establishment of arrangements for the independent scrutiny of research projects based on forensic genetic data held by the Custodian or derived from CJ and crime scene samples held in profiling laboratories.

8.5 The ethics of the NDNAD

This report has discussed a number of important ethical issues raised by the use of DNA profiling and the creation and expansion of the NDNAD. These include questions of whose profiles should be retained on the database for continuous speculative searching, the arrangements for the retention of biological samples in addition to profiles, and the proper uses of the personal information derivable from any analysis of the genetic information contained in profiles and samples.

We recommend that the independent oversight body proposed above has a responsibility for ensuring that these issues are fully addressed (in consultation with key stakeholders and other public bodies such as the Human Genetics Commission and the Information Commissioner).

The indefinite retention of samples taken from individuals is of particular concern because of the potential to derive sensitive genetic information from them and the possible misuse of such information. This raises issues about the security and confidentiality of the samples themselves. In addition, the status of the information

contained in profiles may change over time as knowledge grows about the particular STR loci currently used.

We recommend that, despite arguments for the practical usefulness of sample retention, samples should be retained for a limited period only (in the case of matched crime scene samples this should be until the end of any sentence served by individuals whose prosecution involved the use of DNA evidence). In addition the Information Commissioner should be invited to consider whether profiles themselves should be treated as potentially sensitive personal information.

In our view the most contentious aspect of the current uses of the NDNAD is the practice of retaining, and continuously speculatively searching, the DNA profiles of those never convicted or charged with a recordable offence. The recent House of Lords ruling in the case of *Marper & S* (2004) reflects the Government's own argument for the legitimacy of extending police powers to retain DNA from those arrested or charged but not convicted. It is an argument which relies on a set of judgements about the moral character of persons who come into contact with the police but who are not proven to have committed any crime. The assurance that there is 'nothing to fear' from the retention of samples and profiles – because they are used only for the purposes of preventing and detecting crime – is a Government attempt to allay concerns about NDNAD security and confidentiality. Yet this is a different matter to the privacy related criticism that the removal of individual autonomous control over one's bodily samples is unjustified in relation to people who have never been convicted of a recordable criminal offence.

We recommend that urgent legal and political consideration should be given to the ongoing practice of including on the database those arrested but not charged with a recordable offence. Clearly developed principles and strong evidence-based justifications need to be established if this practice is to be continued.

Issues of informed consent arise under the current arrangements for the retention of both profiles and samples given voluntarily to the police during intelligence led mass screens and other occasions when police seek to use DNA samples to eliminate individuals from further investigation. The practice of seeking 'irrevocable consent' is especially troubling and has no parallel in other research or medical settings in which tissue samples are donated.

We recommend that improved protection is provided for voluntary donors to ensure that consent is fully informed, freely given and subject to revocation on the part of the donor. Further consent should be sought when samples and profiles are to be used for research purposes in addition to the normal practices of speculative searching.

8.6 The future of the NDNAD

We have considered the possible future technological, organisational and legislative development of the NDNAD and grouped these under three broad headings.

The first relates to the collection and analysis of DNA at crime scenes. This includes the development of portable equipment to enable scene of crime DNA analysis, new forms of crime scene sample collection (e.g. spit kits), the identification of phenotypical characteristics from crime scene samples and the remote interrogation of the NDNAD. Each of these raises important issues which may limit their adoption. Both portable DNA analysis and new forms of sample collection raises questions regarding the validity and admissibility of the evidence collected. The remote interrogation of the NDNAD by crime scene personnel creates issues of the confidentiality and security of profile data.

We recommend that early attention is given to these emerging issues in order to safeguard the evidential quality of crime scene samples and matches derived from them along with the confidentiality of the genetic and other information

A second area in which developments are certain is the laboratory analysis of DNA. New techniques that enable familial and partial match searching are already being used and show significant promise. ACPO has acknowledged that a number of ethical issues need to be considered in this context, including the risk that a previously unknown genetic link between individuals might be revealed, or, conversely, the absence of previously assumed genetics links may be shown. Both cases may violate current understandings of appropriate levels of respect for private and family life.

We recommend that current ACPO guidelines for the investigative use of familial and partial matches are kept under continuous review so that new developments in this technology are properly understood and deployed by investigating officers.

Another potentially important and controversial development is the derivation of a suspect's physical characteristics from DNA samples. At present this is restricted to the identification of hair colour and varying inferences concerning 'genetic ancestry'. These are used to aid the police to define a target population of suspects. However, little evidence is publicly available to assess the effectiveness or value of these services. There are also very serious problems in trying to operationalize concepts of race and ethnicity in this manner. One recent case under investigation by the Metropolitan Police has created some anxiety amongst members of a particular ethnic group in London. In the long term the possibility of platform alteration and the introduction of SNP-based genotyping will greatly facilitate the derivation of suspect characteristics. It could also be used to derive profiles from much more degraded samples and offer the potential to produce highly discriminating profiles using a greater number of loci. However, this would also raise many more serious concerns about the sensitive nature of the genetic information contained in the profiles.

We recommend that all such applications of forensic DNA profiling and the NDNAD are fully informed by knowledge of public attitudes to these issues and that a precautionary principle is exercised in order that public confidence in the use of the NDNAD is maintained.

The third area of development relates to further extensions to the scale and connectivity of the database. Under the current remit of targeting the 'active criminal population' there is relatively little scope for the expansion of the NDNAD. Attention is likely to be focused on exploiting the present collection further and more effectively. In particular, this is likely to involve much greater data sharing and exchange by linking the NDNAD to other intelligence sources. This might include more efficient 'joined-up' police record keeping, co-joining the NDNAD to databases in other jurisdictions, and mechanisms for data access and exchange with non-forensic DNA (medical) databases. In addition, there are also ambitious plans to allow data-sharing between forensic databases throughout Europe and the rest of the world – this was a central feature of a recent discussion at the G5 summit in Sheffield (July 2004). This also raises very significant political and ethical issues, which have not yet been fully considered by the Government

We recommend that the current exploration of the scientific and legislative underpinnings of such data-sharing is supplemented by a more thorough consideration of the social and ethical issues that are raised by these

developments, especially those that involve the interoperability of database searching across national jurisdictions.

Finally, the extension of the current collection of DNA profiles and samples held on the NDNAD to cover the entire population has been continually debated since the mid-1990s, with critics fearing the creeping effect of legislation that year-by-year extends the database. No universal forensic database has ever existed in England & Wales despite earlier suggestions for the establishment of a fingerprint database in the Inter-War period. The trajectory of the NDNAD development has been to steadily increase the types and numbers of people contained on it through a process of policy, legal, and organisational 'creep'. Consequently, the NDNAD is substantially different from when it was first created. There is no reason to suggest that this process of expansion has reached an end, although it may pause for technical, economic and political reasons.

No consensus has been reached about the final size of the NDNAD and current debates concerning the possibility of the creation of a universal database is symptomatic of this. The current policy climate, with its concern about the threat of terrorism and the potential mis-use of welfare services, is paving the way for greater public acceptance of increased levels of state surveillance. Furthermore, the commitment to create a biometric ID would engender much of the organisational and technical infrastructure needed for a universal database and would also greatly reduce the social, economic and political barriers to this becoming a reality. However we have already indicated our unease at the most recent extension of the retention on the NDNAD of profiles and samples of those never charged with a recordable offence. Since it seems unlikely that the police would be given powers to continuously speculatively search a universal database, the single most effective use of the NDNAD would thus be compromised.

We recommend that proposals for the further extension of the NDNAD to become a universal database are not pursued by the Government since the continuous speculative searching of such a database is likely to be ruled a disproportionate breach of private and family life under Article 8 of the ECHR.

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Glossary

ACPO: Association of Chief Police Officers.

Active criminal population: The target population of the NDNAD, currently estimated at 2.4 million individuals.

CJ Sample: Criminal Justice Sample. A non-intimate sample taken without consent, or an intimate sample taken with consent, from an individual suspected of involvement in a recordable offence.

Custodian: The person accountable to the NDNAD Board for maintaining the integrity of the database. The current Custodian is the Chief Scientist of the FSS.

DNA: Deoxyribo-nucleic acid.

DNA Database: A searchable collection of DNA profiles.

DNA Hit: A match made between a newly entered and a pre-existing record on the NDNAD.

DNA Profile: The representation of the results following STR analysis.

Familial searching: A speculative search of the NDNAD aimed at matching a crime scene sample with potential relatives of the originator of the sample who is him/herself not currently on the database.

FSS: Forensic Science Service.

Home Office: Government department in England & Wales responsible for the administration of policing.

HGC: Human Genetics Commission.

Intelligence-led screen: Targeted investigation of a 'pool' of individuals by the police in which voluntarily samples are requested as a means of both eliminating and identifying suspects.

Intimate/Non-Intimate samples: Distinction in PACE made between various types of bodily samples and the circumstances in which they can be taken by the police with or without consent.

LCN: Low Copy Number DNA analysis. Capable of obtaining DNA profiles from extremely small amounts of cellular material.

MOU: Memorandum of Understanding.

PACE: Police and Criminal Evidence Act 1984.

PED: Police Elimination Database.

PNC: Police National Computer.

PCR: Polymerase Chain Reaction.

Speculative searching: Automated and continuous comparison between databased profiles and those newly obtained profiles derived from crime scene and suspect samples.

STR: Short Tandem Repeats. A short repeated length of DNA.

SGM+™: The profiling system currently used for the NDNAD. This system uses information from ten unrelated areas of the genome and a sex test to produce a DNA profile.

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